FARM LIVE STOCK OF GREAT BRITAIN

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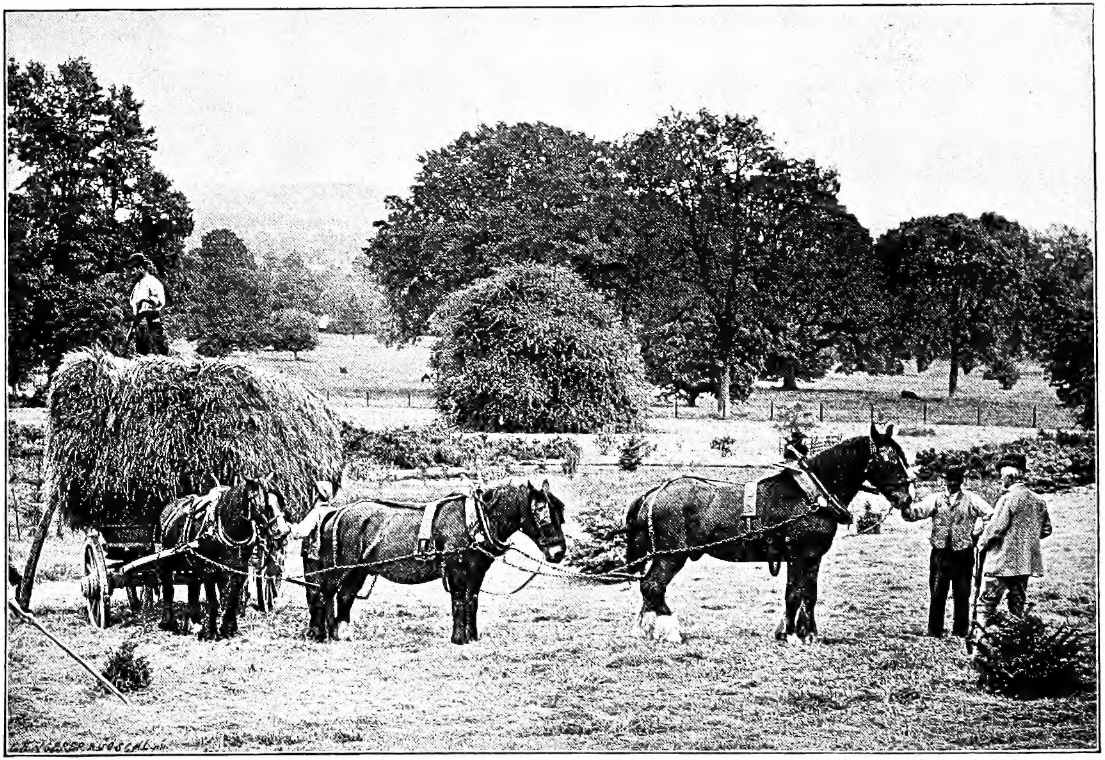
FARM LIVE STOCK

OF

GREAT BRITAIN



A HAYFIELD IN GLOUCESTERSHIRE.

FARM LIVE STOCK

OF

GREAT BRITAIN

BY

ROBERT WALLACE, F.L.S., F.R.S.E., ETC.

PROFESSOR OF AGRICULTURE AND RURAL ECONOMY IN THE
UNIVERSITY OF EDINBURGH

AUTHOR OF
"INDIAN AGRICULTURE"; "THE RURAL ECONOMY AND AGRICULTURE
OF AUSTRALIA AND NEW ZEALAND," ETC. ETC.

Third Edition, revised and enlarged

LONDON
CROSBY LOCKWOOD AND SON
7, STATIONERS' HALL COURT, LUDGATE HILL
1893

DEDICATED

TO THE

RIGHT HONOURABLE HENRY CHAPLIN, M.P.

HER MOST GRACIOUS MAJESTY'S

FIRST BRITISH MINISTER OF AGRICULTURE

APPOINTED UNDER THE BOARD OF AGRICULTURE ACT 1889,

IN RECOGNITION OF THE INTEREST HE HAS TAKEN IN PROMOTING THE

WELL-BEING OF THE

LIVE STOCK INDUSTRY OF THE UNITED KINGDOM.

[ORIGINAL DEDICATION.]

TO

PROFESSOR JOHN WILSON, F.R.S.E., ETC.

WHO FOR THIRTY-ONE YEARS
MOST ABLY FILLED THE CHAIR OF AGRICULTURE IN THE
UNIVERSITY OF EDINBURGH

THIS WORK IS INSCRIBED,

AS A TOKEN OF THE AUTHOR'S GRATITUDE TO HIM AS A TEACHER
AND RESPECT AND ESTEEM FOR HIM AS A FRIEND.

[*Emeritus-Professor Wilson died at Tunbridge Wells in March* 1888.]

[SECOND DEDICATION.]

TO THE PATRONS

OF THE

Institute of Scottish Teachers of Agriculture

(FIFTY IN NUMBER)

FARM LIVE STOCK OF GREAT BRITAIN

IS RESPECTFULLY DEDICATED.

PREFACE

TO

THE THIRD EDITION.

J. WORLIDGE, in the Proemium to his *Systema Agriculturæ*, 1681, says:—"This is an Age wherein to commend or extol an Ingenious Art or Science, might be esteemed a Needless Labour, especially in a Country so highly improved in everything; but that we find the more Noble, Advantagious, Useful, or Necessary, any Art, Science, or Profession is, the stronger Arguments are framed against it; and more particularly against the

ERRATA.

Preface, page ix, line 17. "Sunol," Plate XLV. (**A**) *should be* "Sunol," Plate XLIX. (**A**).

Plate I. **B.**, page 15. *primogenius* should be *primigenius*.

referring to Agriculture assume the rôle of "the vain and more pedant sort of persons, despising the worth or value of what they are ignorant of." By some it is denied that

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History repeats itself, and after the lapse of more than two hundred years we find still prevailing the same spirit of antipathy to Agriculture so quaintly described by Worlidge. It is a misfortune, though perhaps more for humanity than for Agriculture, that men who have received a liberal education, in the ordinary acceptation of the term, in science, literature, and philosophy, so frequently when referring to Agriculture assume the rôle of "the vain and more pedant sort of persons, despising the worth or value of what they are ignorant of." By some it is denied that

Agriculture is an art, or if it be, it is one of such inferior order that it must not be put on the same platform with other arts; although of all arts it is undeniably the oldest and the most widely distributed, as well as the most important, the most indispensable, the most interesting, and the most elevating. With another school of philosophers it is not a science, though in each of its varied and numerous branches it involves the most complicated scientific processes. Agriculture can afford to smile at such pedantry, and excuse it on the plea of ignorance, as was done in olden times. She has also the consolation of knowing that, in spite of the modern philosopher's ingratitude to, and want of appreciation of, Agriculture (in which he contrasts unfavourably with his prototype of Egypt, Carthage, or Rome), yet not a day passes without repeated acknowledgment in deed, if not in word, of his absolute dependence upon her for his very existence; an undeniable proof that in this respect, in spite of all his assumed airs of superiority, the pedantic philosopher is in no superior position to the most humble toiler in the farmyard or the field.

This new edition of FARM LIVE STOCK OF GREAT BRITAIN has been practically re-written, and the information contained in the earlier issues has been greatly increased and extended. Besides a chapter on the Sheep Dog, several useful appendices have been introduced, one of them containing illustrations and descriptions of the consecutive phases of the various Motions of a Horse. The characteristic features of the work have been maintained and emphasised,—chief among these being brevity of expression and copious pictorial illustration. The encyclopedic character of the work has been improved by the addition of numerous footnote references to reliable authorities, where the subjects mentioned can be found discussed in greater detail.

Not only have a large number of illustrations been added, but the general average of the plates as works of art has been very considerably raised, owing to a marked improvement having taken place in the execution of the zincotype blocks, for which it was found necessary to go to the Vienna artists to secure the best results in half-tone printing. It has also been possible to secure a larger number of photographs of the most perfect kind, as originals for new plates to replace inferior ones. By permission of the Royal Agricultural Society, Charles Reid, of Wishaw, the well-known Scottish animal photographer, was enabled to secure for the work a considerable number of pictures of champion and first-prize animals. Though important advances have been made in the art of photography, not only in this country but also in America,—as may be seen by referring to the reproduction of a photograph by Schreber & Sons, of Philadelphia, of "Sunol," Plate XLV. (**A**),—yet there is much to learn in the matter of placing the animal before the camera, so that the length of the hind-quarters may fully appear and yet no part be out of position or out of proportion. A reference to Plate XLII. (**A**) will show a horse in perhaps the best position represented, and yet the great depth and substance of the animal could have been brought out better had the camera of the photographer been raised twelve or fifteen inches higher, to reduce the amount of "daylight" under the horse's belly.

It is hoped that the new edition—so much enlarged and improved as compared with the two previous ones—will be found useful by schoolmasters and others engaged in teaching Agriculture under the County Councils; and that the illustrations produced from photographs of picked specimens of live animals, chosen as typical representatives of the different breeds to which they belong, will be of special value as a means of instruction, as well as for awakening the interest of the youthful agriculturist of the country, in the herds and flocks by which they are surrounded, and for developing their powers of observation.

If agricultural literature has hitherto failed to secure the attention of some of those "wise" men who despise Agriculture, but who, by going to the country, themselves show that they do not quite "esteem it no other than a place for beasts," it is to be hoped that the pictures presented in this volume may induce many such to undertake a course of study which would create in their minds intelligent ideas of the processes of nature, of the rural work of man, and, above all, of the actions and dispositions of the animals which are constantly displayed before them. Such "wise" men would then be able to enjoy during a change to the country relaxation and resuscitation of mind, as well as attain the meaner and less elevating object of the restoration of the animal constitution.

ROBERT WALLACE.

THE UNIVERSITY,
EDINBURGH, *January* 1893.

PREFACE TO THE SECOND EDITION.

IN bringing out the Second Edition of this work it has been necessary to introduce numerous changes which are believed to materially add to the value of it as a Text-book for Students of Agriculture, and at the same time to increase its interest to the general reader. Besides the addition of numerous electroplates in the body of the letter-press, 100 pages of illustrations have been introduced. These have been executed by Angerer & Göschl of Vienna, and are derived, with only two or three exceptions, from photographs taken from life of picked specimens of the various breeds of live stock in the British Isles. It is true that the photographs in certain instances fail at times to do justice to the animals; and in the specimens of pigs, for example, they are defective on account of the awkward positions the animals usually assume while standing, and the constancy of their motion while they remain on their limbs.

The amount of labour expended in securing 100 photographs of typical animals of the various breeds is more than one could at first imagine; and I must ask to be excused if I have had to accept and reproduce photographs which do not represent a few of them in their best light. Photographers do not, as a rule, seem to understand the importance of giving both the hind and forequarters of the beasts an equal prominence; and, again, all lenses are not alike good in maintaining a proper proportion between the dimensions of the limbs and of the body.

Though the plates, as they at present stand, do not quite reach the standard which I feel confident can be ultimately obtained by reproducing photographs taken from life, yet a sense of satisfaction is derived from the fact that the pictures do represent real life. Though the balance of parts may be more or less defective, there are present the natural expression and the little differences of form and features which distinguish one breed from the other.

The eye has been so long educated to look at drawings of animals which have been improved by the pencil of the artist till they are quite unreal and unnatural, that I can easily realise an amount of dissatisfaction being expressed at the method of reproduction adopted in this work. I feel confident, nevertheless, that pictures reproduced as the following have been will grow upon the observer as works of art, and will prove of special value as a means of instruction.

The letterpress of the work has been revised and greatly extended. Short sketches of the histories of the various breeds have been added—full enough to give a general interest, and, it is hoped, to encourage special research into the exhaustive records which are from time to time referred to in footnotes. I have endeavoured to acknowledge in suitable terms the sources of much of my information, but I should also add that I am indebted to the "Stock," "Herd," or "Flock" books relating to the various breeds. I would also refer my readers to the following works, which treat generally of farm stock, and which discuss fully various subjects of interest which could not conveniently be dealt with in an exhaustive manner in the following pages:—

(1.) Youatt's various works on Live Stock, including the "Complete Grazier."* (2.) Coleman's "Cattle, Sheep, and Pigs of Great Britain." (3.) Low's "Domesticated

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[* The new edition of this work, re-written by Dr Fream, is now in the press, and (I am informed) nearly ready for publication.—*January* 1893.]

Animals of the British Isles," 1845. (4.) The same; with a selection of illustrations produced from the collection of 100 oil paintings mainly by W. Shields, R.S.A., belonging to the Agriculture Department of the University of Edinburgh, and presented by the author, who was for over thirty years Professor of Agriculture and Rural Economy in that University. (5.) Pringle's "Live Stock." (6.) Warfield's "Cattle Breeding." (7.) Sheldon's "Dairy Farming." (8.) "Polled Cattle;" and (9.) "Hereford Cattle," by Macdonald and Sinclair.

Without naming any, I desire most heartily to thank all who have been good enough to lend me assistance in the accomplishment of the work entailed in the reproduction of this volume. I have, as has always been my wont, discontinued the use of the prefix Mr. I trust that each authority named will fully understand that this is done from no lack of courtesy, but because I believe that in a book of this sort, it is right and proper to name men as authorities and not as private individuals. R. W.

EDINBURGH, *April* 1889.

PREFACE TO THE FIRST EDITION.

THE object of this volume is to lay before the student, in the shortest possible form, the many interesting facts about Farm Live Stock which ought to be known to every one who takes an interest in this branch of the extensive subject of Agriculture.

The defect of some text-books on this subject is, that they are too voluminous, so filled up with much unnecessary book-makers' padding that it is often a waste of time to read them. The most skilful farmers are not usually of a literary turn of mind, and consequently much valuable information, the result of years of successful experience, is constantly being lost.

I was struck with the concise, clear, and thoroughly business-like style of "The Chemistry of the Farm," by R. Warington, F.C.S., published in Morton's "Handbooks of the Farm" series; and I have endeavoured, as nearly as possible, to make my production fill the same position on the subject of Farm Live Stock as has been secured in that of Agricultural Chemistry by the volume named. The subject-matter has been selected and arranged with the main object of making it a students' text-book, containing all that is necessary in this special branch for the important examinations of the Royal Agicultural College, Cirencester; The Royal Agricultural Society of England; The Highland and Agricultural Society of Scotland; The Royal Agricultural Society of Ireland; and The Surveyors' Institution.*

This accounts for the unusual number of intricate, though very necessary calculations, which occur here and there, and which will require much close attention and study. It is hoped, however, that all those of the farming community who may think the book worthy of their patronage may find the time taken up in reading it profitably spent; as, besides a record of the many common facts known almost instinctively to many practical men, it contains descriptions of the causes, prevention, and remedies of the common diseases of stock given in the ordinary language with which a farmer is familiar.

R. W.

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* Since the first edition of this work was published, arrangements have been made by which the Edinburgh University now grants the degree of B.Sc. in the Department of Agriculture. The Examinations in connection with it should also be included in the above list. The Agricultural Colleges, other than the R.A.C., in Great Britain and her Colonies should also be mentioned; and as the Royal Agricultural Society of Ireland has withdrawn its diploma, the reference to it may be regarded as out of date.

CONTENTS.

PAGE
INTRODUCTION 1

CHAPTER I.

PRINCIPLES OF BREEDING 4

CHAPTER II.

WILD CATTLE 15

CHAPTER III.

BREEDS OF DOMESTIC CATTLE—THE SHORTHORN . . 26

CHAPTER IV.

BREEDS OF DOMESTIC CATTLE—THE LONGHORN, HEREFORD, DEVON, AND SUSSEX 41

CHAPTER V.

BREEDS OF DOMESTIC CATTLE—THE WEST HIGHLAND, WELSH, AND SHETLAND 50

PAGE

CHAPTER VI.

POLLED BREEDS 56

CHAPTER VII.

MILKING BREEDS OF BRITISH CATTLE—THE AYRSHIRE, THE CHANNEL ISLANDS (JERSEY, GUERNSEY, AND ALDERNEY), AND THE KERRY 69

CHAPTER VIII.

THE BREEDING AND MANAGEMENT, AND THE GRAZING OF CATTLE 83

CHAPTER IX.

HOUSE-FEEDING OF CATTLE 100

CHAPTER X.

DAIRYING—PASTURE AND FOOD 115

CHAPTER XI.

DAIRYING—COWS AND THEIR MANAGEMENT 128

CHAPTER XII.

PIGS 154

CHAPTER XIII.

THE HORSE—THE FOSSIL HORSE—THE WILD HORSE—CART HORSES—THE CLYDESDALE, THE SHIRE, AND THE SUFFOLK PUNCH 175

PAGE

CHAPTER XIV.

THE HORSE—THE THOROUGHBRED—HACKNEY—CLEVELAND BAY—YORKSHIRE COACH-HORSE—AMERICAN TROTTER—THE ASS AND THE MULE . . . 194

CHAPTER XV.

THE HORSE—BREEDING AND BREAKING . 212

CHAPTER XVI.

THE HORSE—MANAGEMENT OF FARM HORSES . . . 221

CHAPTER XVII.

SHEEP—BRITISH BREEDS 230

CHAPTER XVIII.

MANAGEMENT OF SHEEP ON CULTIVATED LAND AND LOW COUNTRY PASTURE—THE EWE AND LAMB . . . 257

CHAPTER XIX.

MANAGEMENT OF SHEEP—FEEDING . . 270

CHAPTER XX.

MANAGEMENT OF SHEEP—EXTERNAL PARASITES . 277

CHAPTER XXI.

MANAGEMENT OF SHEEP—INTERNAL PARASITES 285

PAGE

CHAPTER XXII.

MANAGEMENT OF SHEEP—DISEASES 290

CHAPTER XXIII.

SHEEP DOGS 299

APPENDIX A.

TWO TYPICAL EXAMPLES OF THE STOCKING OF FARMS IN SOUTHERN AND MIDLAND ENGLAND 306

APPENDIX B.

LIVE STOCK SOCIETIES 321

APPENDIX C.

NAMES OF PROMINENT BREEDS OF BRITISH LIVE STOCK, WITH THE DATES OF THE ESTABLISHMENT OF THE VARIOUS BREEDERS' SOCIETIES, &C. 324

APPENDIX D.

THE REGULAR PROGRESSIVE MOVEMENTS OF THE HORSE . 326

INDEX 333

LIST OF ILLUSTRATIONS.

PLATE PAGE
A Hayfield in Gloucestershire, *Frontispiece.*
I. A. The Wild White Cattle at Chillingham Park, Northumberland, . . . 15
B. Skull and Horn Cores of the Bos Urus or Primigenius, ... 15
C. Wild White Cows — Cadzow Forest, Hamilton, ... 15
II. Wild White Bull Calves—Cadzow Forest, Hamilton, ... 20
III. Chartley Park Wild White Cattle, . 22
IV. Wild White Cattle in Vaynol Park, near Bangor, ... 24
V. Champion Shorthorn Bull, "Mario," . 26
VI. A. Shorthorn Heifer, "Bracelet," . . 34
B. Booth Shorthorn Bull, "Royal Stuart," 34
VII. A. Bates Shorthorn Bull, ... 36
B. Bates Shorthorn Cow, ... 36
VIII. A. Aberdeen Shorthorn Bull, . . . 39
B. Mixed Booth and Bates Heifer, . . 39
IX. A. Longhorn Bull, ... 40
B. Longhorn Cow, ... 40
X. A. Hereford Bull, ... 43
B. Hereford Heifer, ... 43
XI. A. North Devon Bull, ... 46
B. North Devon Cow, ... 46
XII. A. Sussex Ox, ... 48
B. Sussex Bull, ... 48
XIII. West Highland Bull, ... 50
XIV. A. West Highland Bull, ... 51
B. West Highland Heifer, ... 51

PLATE			PAGE
XV.	A.	Black South Wales Cow,	52
	B.	Black South Wales Bull,	52
XVI.	A.	North Wales Bull,	53
	B.	Black North Wales Cow,	53
XVII.		White Bull—Castle Martin Breed,	54
XVIII.	A.	Shetland Cattle,	55
	B.	Glamorgan Bull,	55
XIX.		Somerford Park White Polled Cattle,	56
XX.	A.	Norfolk White Polled Cow,	57
	B.	Norfolk White Polled Prize Bull,	57
XXI.	A.	Norfolk and Suffolk Red Poll Cow,	58
	B.	Norfolk and Suffolk Red Poll Bull,	58
XXII.		Champion Aberdeen-Angus Bull,	60
XXIII.		Champion Aberdeen-Angus Cow,	62
XXIV.	A.	Galloway Bull,	66
	B.	Galloway Heifer,	66
XXV.		Ayrshire Bull,	70
XXVI.	A.	Ayrshire Two-year-old Heifer,	72
	B.	Ayrshire Cow,	72
XXVII.	A.	Jersey Bull,	75
	B.	Jersey Cow,	75
XXVIII.	A.	Jersey Bull,	76
	B.	Alderney Cow,	76
XXIX.	A.	Guernsey Bull,	78
	B.	Guernsey Cow,	78
XXX.	A.	Kerry Cow,	80
	B.	Kerry Bull,	80
XXXI.	A.	Dexter Kerry Cow,	82
	B.	Dexter Kerry Bull,	82
XXXII.	A.	Pure Pneumonia, as seen in Pleuro-Pneumonia,	96
	B.	Broncho-Pneumonia, as seen in "Corn Stalk" Disease,	96
XXXIII.	A.	Small White Yorkshire Sow,	159
	B.	Large White Boar,	159
XXXIV.	A.	Berkshire Boar,	163
	B.	Tamworth Sow,	163

PLATE PAGE
XXXV. SUFFOLK OR SMALL BLACK PIGS, . . 164
XXXVI. CLYDESDALE STALLION, "PRINCE OF CARRUCHAN," 180
XXXVII. A. CLYDESDALE STALLION, "DARNLEY," . . 184
B. CLYDESDALE STALLION, "THE PRINCE OF WALES," 184
XXXVIII. A. CLYDESDALE STALLION, "PRINCE OF ALBION," 185
B. CLYDESDALE MARE, "MOSS ROSE," . . 185
XXXIX. SHIRE STALLION, "HITCHIN CONQUEROR," . 190
XL. SHIRE MARE, "CHANCE," . . . 190
XLI. SHIRE MARE, "LOCKINGTON BEAUTY," AND FOAL, "MERVILLE," . . . 191
XLII. A. SUFFOLK PUNCH STALLION, . . . 193
B. SUFFOLK PUNCH FILLY, . . . 193
XLIII. THOROUGHBRED HORSE, "GRAND FLAMEUR," 194
XLIV. A. THOROUGHBRED HORSE, "FOXHALL," . 195
B. SHETLAND PONY STALLION, "LAIRD OF NESS," 195
XLV. A. HACKNEY STALLION, "RUFUS," . . 199
B. HACKNEY MARE, "LADYBIRD," . . 199
XLVI. HACKNEY (IN A 2-WHEEL CART), . . 199
XLVII. A. HALF-BRED GELDING, ... 201
B. CLEVELAND BAY HORSE, . . 201
XLVIII. A. COACHING STALLION, ... 203
B. COACHING MARE, ... 203
XLIX. A. AMERICAN TROTTER MARE, . . . 207
B. AMERICAN TROTTER STALLION, . . 207
L. A. POITOU MULE, ... 209
B. JACK DONKEY, ... 209
LI. A. BORDER LEICESTER RAM, . . . 231
B. BORDER LEICESTER EWES, . . . 231
LII. A. ENGLISH LEICESTER EWES, . . . 232
B. ENGLISH LEICESTER RAM, . . . 232
LIII. A. WENSLEYDALE EWE, ... 233
B. WENSLEYDALE SHEARLING RAM, . . 233
LIV. A. LINCOLN EWES, ... 234
B. LINCOLN RAM, ... 234

PLATE PAGE

LV. A. DEVON LONG-WOOL TWO-SHEAR RAM, . 234

B. DEVON LONG-WOOL EWES, . . . 234

LVI. A. COTSWOLD RAM LAMB, ... 235

B. TWO-SHEAR COTSWOLD RAM, . . . 235

LVII. KENT OR ROMNEY MARSH EWES, . . 236

LVIII. A. KENT OR ROMNEY MARSH SHEARLING RAM, 236

B. ROSCOMMON TWO-SHEAR RAM, . . 236

LIX. VERMONT MERINO RAMS, . . . 237

LX. VERMONT MERINO EWES, . . . 238

LXI. MERINO CROSSES WITH SCOTCH BLACKFACE, . 239

LXII. A. SOUTHDOWN RAM, ... 240

B. HAMPSHIRE SHEARLING RAM, . . 240

LXIII. A. SHROPSHIRE EWES, . . . 241

B. SHROPSHIRE DOWN RAM, . . . 241

LXIV. A. SUFFOLK EWES, ... 243

B. SUFFOLK RAM, ... 243

LXV. A. OXFORD DOWN RAM, ... 245

B. RYLAND RAM, ... 245

LXVI. A. SOMERSET AND DORSET HORN EWES, . 246

B. SOMERSET AND DORSET HORN RAM, . 246

LXVII. A. AN EAST COUNTRY CHEVIOT RAM, . . 248

B. A WEST COUNTRY CHEVIOT EWE, . . 248

LXVIII. A. SCOTCH BLACKFACED HIGHLAND EWES, . 249

B. SCOTCH BLACKFACED MOUNTAIN RAM, . 249

LXIX. HERDWICK RAM, ... 251

LXX. A. TWO-SHEAR LONK EWES, . . . 252

B. TWO-SHEAR LONK RAM, . . . 252

LXXI. A. IMPROVED WELSH MOUNTAIN RAM, . . 254

B. WELSH MOUNTAIN RAM, . . . 254

LXXII. A. EXMOOR RAM, ... 256

B. EXMOOR EWE, ... 256

LXXIII. SHEARING SHEEP AT OVERSHIELS, STOW, . 265

LXXIV. WOLSELEY SHEEP-SHEARING MACHINE, . 267

LXXV. COLLIE DOG, "STEEPLE JACK," . . 302

ELECTROTYPES.

PAGE
White Cow with Black Points, ... 25
Typical Ideal Specimen of Aberdeen-Angus Cow, . . 59
Professor W. O. Williams's Intratracheal Injection Syringe, . 89
Small Biting Ox-Louse (*Trichodectes scalaris*), . . . 91
Large Sucking Ox-Louse (*Hæmatopinus eurysternus*), . . 91
Ox Warble Fly, Maggot, and Chrysalis, . . . 98
Breathing Tubes of Warble Maggots, ... 99
Skull of Ox, illustrating Dishorning, &c., ... 103
Bistoury, ... 133
Self-acting Cow-Milker, ... 133
Trochar and Canula, ... 139
Cow-Breeches, ... 148
Model Sides of Bacon, ... 157
Shelter Shed on Wheels for Pigs, ... 168
Forty Points of a Horse, ... 179
Forms of (*a*) the *Scapula* and (*b*) the *Humerus* of a Clydesdale (Figs. 1, 2), ... 189
Shire Stallion charging in Loose Box, ... 229
Side View of a Lambing Pen, ... 260
Net Breeches for a Ewe, ... 262
Sheep Drenching-Tin, ... 289
Progressive Movements of the Horse (six illustrations), 326 to 331

MAPS.

Orographical Features—British Isles, ... xxiv
Distribution of Cattle, ... 83
Distribution of Sheep, ... 230
Distribution of Agricultural Population, ... 306

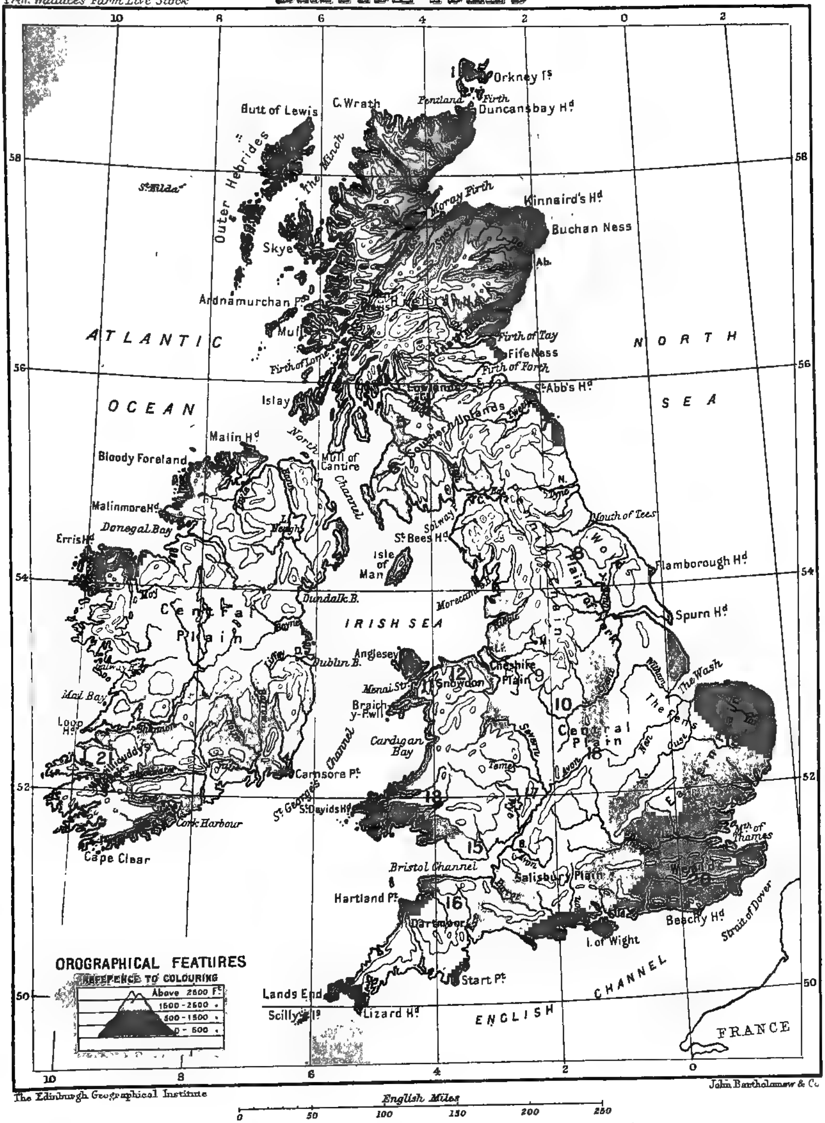
KEY TO THE FIGURES

Indicating the Locality of each Breed of Cattle on Map showing Orographical Features.

NAME OF BREED.

1. Orkney and Shetland.
2. Aberdeen-Angus Black Poll.
3. West Highland.
4. Hamilton, or Cadzow Park Wild White.
5. Ayrshire.
6. Galloway Black Poll.
7. Chillingham Park Wild White.
8. Shorthorn.
9. Somerford Park White Polled.
10. Chartley Park White Polled.
11. North Wales Black, or Anglesey.
12. Vaynol Park White Breed.
13. South Wales Black, or Pembroke.
14. Variety Castle Martin White.
15. Glamorganshire.
16. Devon.
17. Hereford.
18. Longhorn.
19. Red Poll.
20. Sussex.
21. Kerry.

BRITISH ISLES



The Edinburgh Geographical Institute

John Bartholomew & Co

The Red Figures refer to localities of different Breeds of Cattle – See key on opposite page

FARM LIVE STOCK

OF

GREAT BRITAIN.

INTRODUCTION.

A PROPER knowledge of the habits and treatment of the animals of the farm is, without doubt, the most important branch of a farmer's education. It is the one, too, which is found to offer the greatest difficulties to men who take to the profession of farming late in life. In fact, few men who, as boys, have not been intimately associated with animals, can ever hope to attain the first rank as judges or managers of stock. For the same reason we never find a really first-rate shepherd in a hill district—the place where superior knowledge and intelligence are most wanted—who has not as a boy seen, and assisted in, all the many little details of the management of a flock. He drinks in the information, as it were, with his mother's milk, and does not realise in after-life that he was not born with much of the knowledge he possesses.

It is not only a knowledge of animals that a boy gains by associating with them, but also an interest in them. They are the playthings of his youth, and the objects of his affection as he grows in years. A first-rate judge and prize winner—it does not matter in what class of stock—is invariably found to spend much of his time gloating over the points of his favourite beasts. It is only in this way, and not from books, that a man can ever master the details of structure and the peculiarities of breed and constitution, and obtain that knowledge which can alone lead to victory in the show-ring.

A servant intrusted with the management of stock must make his charge his hobby if he is to be successful in his avocation. A man is quite as happy in the enjoyment of one hobby as of another, provided it be of his own choice; and it is much better for himself on account of his own comfort, as well as of the permanency of his employment and amount of remuneration for the same, if the hobby is that by which he wins his daily bread. One of the weak points in the present system of education, so far as agricultural labourers are concerned, is, that no adequate provision is made for their learning, while young (the time when all the deepest and most lasting impressions are formed), the business by which they live.

Agriculture—more particularly in the **stock branch**—is not like an ordinary trade or profession, which admits of hard and fast rules being laid down, and of being learnt in so many years, even after a man reaches maturity. Its principles, whether as they are required by the farmer, or by the labourer, have to be taken in little by little, through a long period of time, which must embrace a considerable proportion of the boyish days. The knowledge must come, as it were, instinctively. It cannot be learnt by rote. It would be wrong to deny the necessity of giving every working man in the kingdom a good plain education. Putting aside all considerations of sentiment towards our fellow-men, and the necessity of having every one educated who is to have a voice in the government of the country, there is an undoubted advantage in having work performed by the aid of that intelligence which accompanies education. But what calls loudly for a protest is the virtual prohibition of boys learning, at the only time when they can do so perfectly, the one branch of their business by which they themselves shall live and in time rear families.

The present system is much too one-sided. It is the extreme into which we have fallen after a long period of deficiency in the branch which now receives too much attention. Youth is entirely spent in the acquiring of book-learning; interests and inclinations which must develop are led into channels far away from the employments of the future life; work, when it has to be done, is performed as a drudgery and with a heavy heart; the frame is not trained, as it is being built up by Nature, to dexterity and efficiency, nor yet is it strengthened and enlarged by that practice which always precedes efficiency. Why should not our educational system provide for the training of our labouring classes in both its branches, manual and mental, when this would conduce so much to their future happiness and the public good?

In treating our subject, "The Principles of Breeding" will be discussed first; the different kinds of stock—cattle, pigs, horses, and sheep—will be taken up in order; and a number of farm-stocking and other calculations will be given.

Darwin's work on "Animals and Plants under Domestication" treats of nearly all the trustworthy principles of breeding that have yet been propounded, so that in this branch originality to any large extent must not be expected. The writer, however, avoids repeating anything which he has not been able to verify in an experience which has extended over more than a quarter of a century.

CHAPTER I.—PRINCIPLES OF BREEDING.

Family Resemblance — Heredity—Darwin's Theory of Pangenesis—Weismann's Continuity of Germ-plasm Theory—Force of Inheritance—Constitutional Weakness—Imagination—Crossing and "In-and-in Breeding," including Line-Breeding—Atavism in Pure Breeds and in Crosses—Domestication—Barrenness.

THE **strong family resemblance** which is seen both in the human species and amongst animals related to each other is a direct consequence of the existence of the first law of breeding, which is not at all times constant, but holds good as regards general characteristics,—viz., that "like begets like," "or tends to produce like." Other laws are in operation at the same time; consequently, when we come within the immediate spheres of their action, this and various other laws have to be modified to harmonise with surrounding conditions. The influence of a parent, as such, in his or her first function, is not always exerted under exactly the same conditions, and we have differences between individuals, alike in many respects, which distinguish them from one another.

To the uneducated eye, every member of a herd of Galloway cattle, or of a flock of Southdown ewes, looks exactly like its neighbour, and a townsman stares when he is told that some shepherds know individually every member of a flock of perhaps two or three hundred sheep.

Heredity, so well expounded by Charles Darwin, is the perpetuation of like characteristics in parents and offspring. **Variation,** on the other hand, is the production of unlike characteristics. To provisionally explain why like tends to produce like, Darwin propounded the theory of **Pangenesis.** He assumed that *gemmules*, retaining the characters of the original cells, are shed from every cell in the body; that the gemmules are aggregated in the reproductive cells; and that by this means the characters of the original structure are transmitted from generation to generation.

Professor Weismann,* elaborating the theory of the **continuity of germ-plasm**, advanced by **Francis Galton,** maintains that there are two distinct classes of cells involved in the structure of the reproductive germ-cells,—the one being the origin of the body, or *soma*, the other being exclusively for the development of reproductive germ-cells, which, though associated with the body, are nevertheless, in everything, except in the matter of protection and nourishment, independent of it. The reproductive germ-plasm in any germ-cell is therefore supposed to be derived from the parent germ-cell, and not from the individual in which it was produced. This theory practically excludes the possibility of the continuance in a breed of the results of any change arising in the individual which does not originate in the cells exclusively devoted to the perpetuation of the species. Any change in, or influence exerted upon, the body of the immediate parent could not, according to Weismann, be reproduced in the young. Although we are not in a position to actually disprove this theory with which the name of Weismann has become familiar, we are not prepared to accept it, as the great mass of negative evidence is against it. If it were accepted, we should have to believe that no form of disease which affects the bodily structure alone is capable of being inherited.

The force of inheritance is strongest in old and well-established pure breeds, but even among the best a very inferior animal (as the American "scally-wag" among cattle) may appear at times. This degenerate specimen should never be allowed to breed. It is by getting rid of all such inferior, or even moderately good, animals that our breeds are improved. Weeding by the hand of the breeder, or "artificial selection," acts much in the same way among domesticated animals as the law of the "survival of the fittest" does among wild ones. A well-bred, though plain-looking bull, if he has no deformity, or no very objectionable points, usually breeds much better and more uniform stock than a handsome one without a good pedigree. In selecting, it is much more important to have the sires than the females good, because, besides the greater potency usually possessed by the male, one bad sire may affect a large number of offspring, whereas an inferior female only influences her own young, which are comparatively limited in number.

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* Translations of Weismann's essays were published by the Clarendon Press, Oxford, in 1889. (New edition, 1891-92.) "The Germ-Plasm: A Theory of Heredity," published by Walter Scott Limited, London and Newcastle.

The quality of the sire becomes a most important matter when taken in connection with the fact that "the influence of the first male by which a female produces young may frequently be seen in her future offspring by different sires." Every one knows that should his English terrier bitch be "lined" for the first time by a Dandie Dinmont, she will years after throw puppies with some of the Dandie characters. The same rule holds, though perhaps not to such a marked degree, with certain of the larger animals. For this, and the other reasons which induce breeders to keep good stock rather than bad, a mongrel bull should not be put to good cows. The best bred animals are often, nay usually, far from perfect in some point. It is most important if a bull (or sire of any breed) with a special defect—say a hollow, or weakness behind the shoulder,—has been used, that all succeeding sires should be specially strong in that particular point, whatever it was, else there might in time be a general defect established in the whole race of descendants. Males are more variable than females; for example, in a mountain breed of sheep, it is much easier to select a large number of ewe lambs than of ram lambs good enough to be exhibited in a show-yard.

Animals with constitutional weaknesses amounting to unsoundness should not be used for breeding.* Defects resulting from accidental injuries are sometimes transmitted to the young,—especially when disease follows an injury,—and may, or may not, be hurtful. The tendency to bony exostoses on the leg bones of a horse, from the parents contracting these through hard work on the road, would be a case of the first kind. The following is an illustration of the second:—A black spaniel bitch, belonging to Commander Harrison, R.N., had the tip of her tail caught in a door; white hairs grew from the injured part, and she bore various puppies with white-tipped tails afterwards, though she had never done so previous to this time.

Imagination sometimes comes into play in breeding, especially with regard to colour. The colour of any object at which an animal looks while conceiving, or during the early stages of pregnancy, sometimes governs the colour of the young, as the following examples testify:†—(*a.*) A well-lighted cowshed, with white-washed walls, is believed to have an influence in making the calves lighter in colour. (*b.*) A pure-bred Ayrshire cow at Auchenbrack, Dumfriesshire, gave birth to a dark dun calf, the same colour as her mate, which was a cross from a Channel

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* "In France all entire horses, whether kept at the Government *haras* or by private persons, must be examined and passed as fit for service, and no others can be used. The percentage of unsound stallions in France has fallen from 5.84 per cent. in 1880 to 2.93 in 1890, the continuous decline, accompanied by an increase in the number of entire horses, proving the wisdom of the system of inspection."

† This influence was known to the ancients, *vide* the thirtieth chapter of Genesis, in which appears a description of Jacob's practice of pilling rods of green poplar, hazel, and chestnut to produce white strakes, so that the flocks conceiving before the rods might bring forth cattle ringstraked, speckled, and spotted. It is interesting to note that it was the time of conception which was considered the important time in this connection.

Islands cow. The peculiar dun was not an Ayrshire colour. (*c.*) It is recorded of M'Combie of Tillyfour that he succeeded in preventing his black Polled Angus cows from breeding red calves by putting up a high black fence round the paddock, in which he mated them as they came in season, thus preventing their seeing the red cattle of his neighbours. (*d.*) One of the most remarkable instances of the influence of imagination on the colour of cattle has within the last few years been closely studied at Glamis in **Lord Strathmore's Polled Angus herd,** numbering about thirty cows of the most highly prized strains of blood. As the results of the experiment are so interesting, and as the facts have not hitherto been published, we give them in detail.* The cows with bull-calves were annually separated from the cows with heifer-calves when turned out in May, and the herd was thus grazed in two divisions of about equal numbers (which for convenience we shall term A and B), but from year to year the cows forming these divisions varied with the sexes of their calves. It was observed for a number of years that about 20 per cent. of the calves produced by the cows of division B were "badly marked" in colour,—viz., red, or black-and-white,—while the colour of the calves of division A was uniformly black, as it ought to be. The same well-bred bulls were put to the two divisions, and changed from one to the other from time to time. The field in which division A grazed was located so that no cattle of broken colours could be seen by the animals at pasture in it, while the field in which division B was kept adjoined two other fields, in one of which up till 1890 were pastured black steers, and in the other Ayrshire cows, displaying a great variety of broken colours. The black polled cows of division B were within smelling distance and within full view of the cattle in the two fields in question (being separated merely by a wire fence), and in consequence from two to four badly-marked calves were born annually. In 1890 both of the fields adjoining division B were occupied by red-and-white cattle, with the result that six pure-bred Polled Angus calves came badly marked, some being black-and-white, and others red. Some of the cows which bore badly-marked calves were three or four months gone in calf before they were brought in contact with cattle of other colours than their own, from which it may be inferred that the influence of imagination is not confined to the period of conception. One of the red calves had a black fringe round his muzzle, and a black stripe along the back. This red calf developed into a pure black bull, with a reddish fringe round the muzzle, and a reddish stripe along the back. In 1891 the adjoining fields were intentionally stocked with black cattle exclusively, and all the calves of 1892 were for the first time for several years of pure Polled Angus colour, like the colour of the sires and dams, and of the calves of division A, which bred always true to colour. Only one calf had a small patch of white upon it, but this is a common occurrence in the best-bred black polled cattle. The fact that the sires of the badly-marked calves of 1891 were the same as the sires of the black calves of 1892 makes the results of this interesting experiment all the more interesting.

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* Compiled from information supplied by A. Ralston, factor on the Glamis estate, by whose instructions the experiment was carried out by Henry Lindsay, bailiff, Earl of Strathmore's home farm.

In the case of the **colour of the crosses** derived from two or more distinct breeds, reversion to some ancient ancestral form plays an important part. Certain colours can be, as a rule, depended upon to produce in the young other and altogether different colours from those of the parents; for instance, a black Galloway cow and a pure white shorthorn bull almost constantly throw a very dark roan or blue-grey. A light roan bull might give the same result as a white ; but a dark roan or red will get either black or red calves, which are not so much desired. In the same way, when Ayrshire cows are crossed with a shorthorn, a light-coloured bull, as compared with a dark one, throws more of the shorthorn character into the colours of the calves, which bring the highest prices, as they are usually reared for fattening purposes. All constancy in colour is lost in crosses other than first crosses.

CROSSING AND "IN-AND-IN-BREEDING."

The crossing of families not related to each other usually gives increase of vigour and larger size, though sometimes the distance between the characters of these families is so great that the result is somewhat like a cross between two distinct breeds. For this reason many breeders at one time objected to mingling the blood of Booth and of Bates shorthorns, but the benefits resulting therefrom have been found to outweigh the disadvantages.

Too close "in-and-in-breeding," or pairing of animals related to each other, causes great loss of constitutional vigour, loss of size and fertility, and sometimes malformation—as in the case of a pig bred at Twiglees, Lockerbie, which at birth lacked a number of the vertebral segments. Pigs show the bad effects of consanguinity sooner than any other farm animals. Darwin points out that this is perhaps on account of their comparatively solitary habits when in a state of nature. Gregarious animals do not suffer so much ; they have been more accustomed to it, and Nature has accommodated herself to the circumstances.

Shorthorn cattle have proved to be not so much the worse for in-and-in-breeding as most other stock. The distinct type peculiar to them has undoubtedly been formed and fixed by in-and-in-breeding. The most prominent advantage of in-breeding is this stamping of family characters or types, and it cannot well be dispensed with in the formation of new breeds or the improvement of old ones.

"**Line-breeding**" is a modified form of in-breeding which is steadily becoming more popular as the evil results of close-breeding become better understood. Animals belonging to the same "line" of descent are bred together, but close relationships are strictly avoided.*

Crosses between two distinct breeds mated the proper way make the best fattening animals. The sire, in virtue of his greater potency, should be of the more improved breed as regards beef-producing qualities, unless both are equally good; for example, the shorthorn bull breeds well with cows of milking breeds, or of slow maturing sorts, as Kerry, Ayrshire, West Highland, or Galloway. Crossing in any other way is unsuccessful. Of late years, since the Polled Angus breed has been so much improved farmers cross shorthorn cows successfully with Angus bulls.

In farm stock it is considered that the male contributes specially to the external form, the female more to the vital and internal organs. This does not belie the fact that a calf has often a very strong likeness to its mother in expression, if not in form.

With a thoroughbred horse on a mare of another breed, the resulting offspring has generally a symmetrical appearance. A cross bred the other way is often strong and useful, but plain, usually about the hind quarters and the head.

Sheep come under the same rule as cattle. Rams of any of the improved varieties of Leicesters or Downs may be used with advantage, under certain conditions, to put to ewes of the various mountain breeds.

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* By this means constitutional vigour is maintained, and uniformity of type is given to the progeny. The advantages of in-and-in-breeding are secured without the ultimate correlated disadvantages, but the rate at which a desired type can be reached by line-breeding is slower than that of in-and-in-breeding. Only the impatient and the inexperienced are now found to follow the more dangerous headlong course.

The first cross between two breeds is, in character, usually intermediate between them ; but after the first cross it cannot be predetermined how the tendency may run.

The first cross is the strongest : after-crosses get smaller and weaker, and the more so the longer crossing is continued, especially if close-breeding be practised, necessitating the going back now and then to one of the pure breeds for a sire to infuse new vigour. This so far explains the success of crossing mongrel cows with a pure shorthorn bull.

Atavism, or "throwing back," or "reversion," is the appearance in an animal of some character which the immediate parents had not, but which existed in its ancestors.

This may occur in two classes—(1.) In Pure-bred Stock. (2.) In Cross-bred Stock.

1st. Reversion in Pure Breeds.—The aboriginal species of domestic cattle and sheep no doubt had horns for defence and attack ; now many are without them, though they yet exist in the cases of most mountain breeds at home and abroad. Sometimes a ram of a polled breed, such as the Cheviot, develops small horns. In cattle this is also the case, as imperfectly formed horns at times appear in both Red and Black Polls.

Sheep, for their better protection when wild, were originally brown or dingy black. Now and then in the best flocks reversion is shown by the appearance of a black sheep ; and so frequently is this correlated with poor quality, that it has become proverbial to describe the unfortunate member of a family as the "black sheep."

2nd. Reversion in Cross Animals.—This is much more common. When two distinct, improved breeds are crossed, the offspring has a strong tendency to revert to one of the pure forms, or rather to an inferior ancestor of one of them ; and this lasts for generations. The young often assume the colour of one parent, and in time change it for that of the other. The calf from a black cow by a red bull is often born red or brown, becoming black afterwards; and the mouse-coloured foal of a chestnut mare may become chestnut.

"**The act of crossing** in itself gives an impulse towards reversion," as seen by characters appearing in the young that had not been seen in either pure breed for generations. Calves are sometimes produced white with dark ears, like the ancient wild cattle, when a red shorthorn bull is put to West Highland cows.

Cross-breds are often wilder and more restless than pure-breds.* This is noticed particularly in sheep and cattle. Cross sheep are not so easily fenced, and a dairy of cross cows is much more difficult to train to stand for milking in the field than pure shorthorns.

Domestication increases the fertility of animals, if they are properly bred and not overfed. Sheep being in an improving condition at the time of conception, the number of doubles or triplets is increased. In a flock of ewes the largest number of twins is "got" the first few days the ram is let out. The first-born of most animals run slightly more to the female than to the male side.

Barrenness or uncertainty may be induced by the following causes:—1*st.* Over-feeding in the case of either sex, thus loading the reproductive organs with fat. The remedy in the case of over-fat animals is judicious starving, and plenty of exercise or work in the case of cattle and horses. Some foods induce uncertainty in breeding more readily than others. Sugar, molasses, and linseed are amongst the worst; but these are, nevertheless, often used to prepare beasts for show or sale, because they produce a smooth and glossy coat of hair, as well as lay on fat. These foods would not do damage if given in moderation with hay or straw; it is when supplied in addition to a full feed of other concentrated food that they do injury. Foods for breeders should be particularly rich in phosphates, and should have more albuminoids to fat-formers than in the case of fattening animals; such foods are—beans, peas, lentils, gram, &c. Very fat animals do not come often in season, and, consequently, cattle settle better and feed faster as they approach what the butchers designate "fat-ripe."

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* This rule refers to pure breeds of the same degree of wildness. If a wild and a docile breed are mated, the progeny will be intermediate in wildness.

2nd. Too low condition, especially if associated with exposure to cold and wet, as in the case of cattle wintered in the open air on poor food, or of heavy milking cows "sucked down" by a large calf, or perhaps by two calves. This occurs most frequently in heavy milking breeds when the calves run constantly with their mothers.

3rd. Constitutional weakness from in-and-in-breeding.

4th. Being a free-martin or dumb-martin, that is, a heifer born one of a pair of twins, the other being a bull. In this case the external as well as the internal organs of generation are imperfectly formed and contracted, and there is usually also more or less of a masculine appearance about the head.

Horses do not conform to this rule, but twins from a mare are very rarely seen,—because when they do occur they are usually prematurely born, or die if they come to full time.* The female twin among sheep is quite fertile.

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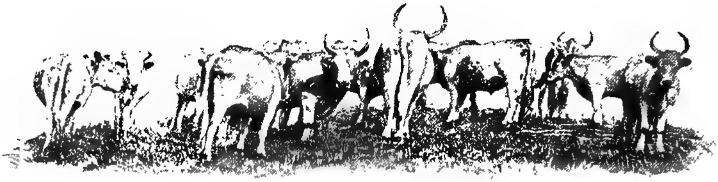
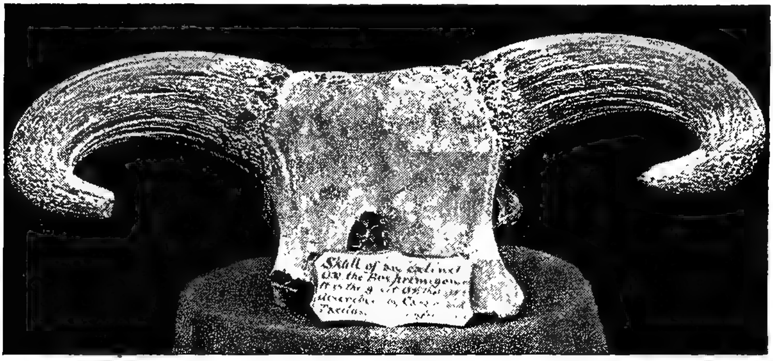
* From the *Live Stock Journal.*—"Last year (1891) we announced that Mr B. A. Posford, of Falkenham Hall, Suffolk, had sold for exportation the twin Suffolk colts Romulus (2185) and Remus (2199), foaled on April 2nd, 1890, sire Wedgewood (1749), dam Smart (1732). The dam brought them up, and they had no milk or artificial food. Mr Posford sold them in May 1891 to Mr G. H. Hebden, who took them to New South Wales. Mr Posford has in his stud twin colts this year (1892), these having been foaled on May 3rd, out of a Shire-bred mare by Captain X (9012), the property of Mr W. Wilson, Reydon Hall, Oxford. One of the foals is a colt and the other is a filly; they are both good, strong foals, and as large as many single ones. The dam appears to be a good mother, and there is every prospect of the colts doing well." This is evidence that twin foals do sometimes survive.

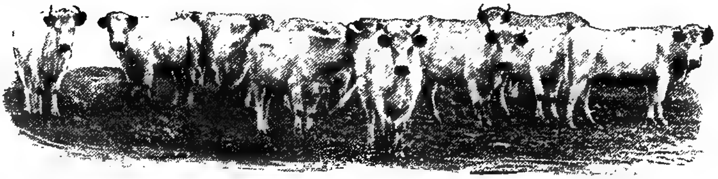


A.—THE WILD WHITE CATTLE AT CHILLINGHAM PARK, NORTHUMBERLAND.
The Property of the Right Hon. THE EARL OF TANKERVILLE.



B.—SKULL AND HORN CORES OF THE *Bos urus* OR *primogenius*, IN the GRIERSON MUSEUM, THORNHILL, DUMFRIESSHIRE.

Width of Skull below the Horns, 12 inches; Width on the Crown, $8\frac{7}{8}$ inches;
Length of Horn Cores, 27 inches; Girth close to the Roots, $13\frac{7}{8}$.



C.—WILD WHITE COWS—CADZOW FOREST, HAMILTON.
The Property of His Grace THE DUKE OF HAMILTON, K.T.

CHAPTER II.—WILD CATTLE.

Aboriginal Cattle of Great Britain—*Bos urus* or *primigenius*—Another Distinct Species, *Bos longifrons*—Relationship of *Bos urus* to Wild Park Cattle—The Home of the Forest Cattle—Domesticated Animals—The Wild Cattle at Chillingham Park—*Bos Scoticus*—The Hamilton or Cadzow Park Cattle—Chillingham Cross—The Chartley Herd—The Vaynol Park Herd—White Cattle in the Zoological Gardens.

THE **Aboriginal Cattle* of Great Britain,** in common with those of the continent of Europe, belonged to the *Bos urus* or, to use the more recent and more common name, the *Bos primigenius*. Although it has been asserted that the original colour of this species was black or mouse brown, it is now pretty generally believed that the original colour was white, with black or brown points, such as may be seen in the more or less degenerate representatives of the species in the parks of Chillingham, Hamilton, Chartley, and Vaynol—the only places in the United Kingdom, with the exception of the Zoological Gardens in London, where wild cattle exist. In his pristine form the wild bull of the forest approached to the size of an elephant, as may be gathered from the enormous dimensions of a considerable variety of remains dug up from time to time and preserved.

Another distinct species, the *Bos longifrons*, with small and slender form, short horns, and hair of a dark colour, was found to be the prevailing domesticated bovine animal before, and up to, the date of the Roman conquest. Its descendants are now to be seen, after crossing to a greater or less extent with the *Bos urus*, in the Scotch West Highland, the Welsh, the Devon, the Sussex, the Kerry, and the old Irish breeds.

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* For an exhaustive account see "*The Wild White Cattle of Great Britain*," by the Rev. John Storer. Cassell & Co. To this excellent work the Author is indebted for part of the historical matter adopted.

There is a strong presumption that the ancient forest cattle, the descendants of the *Bos urus* of Cæsar, were the immediate progenitors of the wild park cattle of the present time, and also of the many herds which in comparatively recent years existed in various parts of the United Kingdom. As population increased and encroached upon the vast forests which covered the surface of the country, the numbers of wild cattle declined with those of wild beasts generally, and, to preserve them from extinction, the great lords enclosed and protected the decreasing remainder. The small numbers and the confinement within restricted areas subjected them to an undue amount of in-and-in-breeding, and the large majority of the herds in question have bred themselves out and disappeared ; while those that remain, by their diminished size, refined bone, and in some instances a tendency to barrenness, show that whatever they may have gained by it they have also suffered from close interbreeding.

The home of the forest cattle, at least during the latter period of their freedom, was the north of England and Scotland, more especially the dense forests covering the hilly regions. It is supposed that they were all horned and of one race, of a similar colour—white, or at times creamy white, with black or dun points,—though some of their domesticated descendants are without horns.

Domesticated animals of a similar type to the wild forest breed were also to be seen in ancient times, and were noted for their milking qualities.

The wild cattle in Chillingham Park,[*] the property of the Earl of Tankerville, are said to be the most characteristic descendants of the forest breed,* though they only differ in minor points of detail from those in Hamilton Park—another well-known herd representative of the *Bos Scoticus.* Storer gives it as his strong opinion that these cattle were not so persistently in-and-in-bred for hundreds of years as is usually supposed; but that until not very long ago fresh blood was brought from other herds, and that in this way their existence has been prolonged. Dr Ramage in "*Drumlanrig and the Douglases (1876),*" quite unintentionally confirms this view by saying "there is a tradition that about 100 years ago the whole stock" (meaning the Drumlanrig herd of white cattle) "was sold and driven off to Chillingham."

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[*] First brought into public notice by Landseer's famous picture of the "Dead Bull." A description of the hunt, which ended in the death of the subject of the picture, together with many valuable details of the Chillingham

One of the visible indications of the close-breeding which has nevertheless taken place in this herd is the presence of a rash (no doubt of a scrofulous character). A tendency to barrenness points to the same cause, the rate of annual increase of the breed being only one in five.

It has recently been noticed that some cows live to a great age, one which died in December 1891 being eighteen years old.

At one period the bulls possessed a mane which developed with maturity, but decreased with old age. It is also noticed that the tendency to show black spots on the skin, especially about the neck and head (and to a greater degree among the Hamilton than among the Chillingham cattle), also increases with age.† Black or dark brown and white,

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herds may be found in an interesting *brochure,* by the Earl of Tankerville, "The Chillingham Wild Cattle. Reminiscences of Life in the Highlands, 1891," printed at the *Surrey Comet* office.

[*] Rütimeyer in "*Domestic Cattle of the Ancients,*" says of the Chillingham breed (after examining the bones from the Swiss lake dwellings, and comparing them with the skeletons of cattle of the present day), that it is "the purest type that he has found of the original Bos."

[†] A parallel to this is to be noticed in the dark spots which develop on the ears of Border Leicester ewes as they grow old.

and also black calves assuming a brown tinge, have from time to time been dropped in both herds named, but these have been destroyed to maintain uniformity. In this example of atavism is clearly seen the link connecting the white with the allied black or dark breeds. The skins are thin, and under the white hair they are white in colour, and thus differ in a most important characteristic from the dark-skinned and white-haired animals belonging to the Zebu race or humped cattle of India—the *Bos Indicus*—the skins of which are mostly jet black, though some are of a yellowish or nut-brown colour.

Storer says:—

"The tongues of the Chillingham cattle are slate-coloured above, and of a reddish-brown colour on the under side; the teats of the cows, unlike those at Chartley, are white; and although the muzzle is black, *the under lip* is white." And again: "Besides the red ears, a faint line of red hair exists, as if drawn by a pencil, immediately above the dark and hairless muzzle." Quoting from Lord Tankerville, he adds: "In form they are beautifully shaped. They have short legs, straight back, horns of a very fine texture, thin skin, so that some of the bulls appear of a cream colour; and they have a peculiar cry, more like that of a wild beast than that of ordinary cattle."

In 1891 Lord Tankerville writes:—

"These peculiarities of colour and markings are very uniform and distinctive in the wild herd. They are pure white when first calved and licked clean by their mothers, but become of a more creamy white colour afterwards. The horns are white, with black tips; the hoofs and noses are black; the eyes are fringed with long eyelashes, which give them depth of character; their bodies are symmetrically formed; and their fine shoulders enable them to trot like match horses with amazing rapidity."

The **average weight** of the cattle killed between 1862 and 1889 was, for bulls, 560 lbs.; for cows, 420 lbs.; and for steers, 570 lbs.; and the flesh is of specially fine flavour and quality—the lean muscle being mixed or marled with fat. The proportion of offal to carcass is remarkably small.

Naturally these cattle are wild and timid, and try to escape from the presence of man. They are, however, extremely ferocious and dangerous when in close quarters and at bay.

Their instincts are essentially those of wild animals. Their keenness of scent, and the habit they possess of hiding their young for a few days after birth, are good illustrations of the fact. Domesticated cattle which have recently been reclaimed from the wild condition, such as West Highlanders and members of the South Wales breed, have retained this instinctive habit for generations.

The number of the pure herd has recently varied from 73 (in 1890) to 66 (in January 1892).

Experiments in crossing some of the wild cattle with pure-bred shorthorns were begun in 1875, and are yet being carried on. At first a wild bull was mated with two high-bred shorthorn heifers, but owing to the failure of the first female cross to breed all subsequent crossing has been between wild females and shorthorn bulls. A steer resulting from the latter union was exhibited at Smithfield in 1888, and was placed third in a good cross-bred class. He was sold at £65 when within six weeks of four years old, his live weight being 16 cwts. 2 qrs. 24 lbs.; his dead weight, 87 st. 10 lbs.; loose tallow, 11 st. 4 lbs.; and hide (very thin), 6 st. 4 lbs. He received no food but grass till within three or four months of the time he was exhibited.

In 1889 another cross-bred steer, three years and eight months old, gained the third prize in his class at Smithfield. He weighed 18 cwts. 2 qrs. 5 lbs., and his dressed carcass scaled 96 stones. The beef of both animals was pronounced to be of exceptionally good quality. Lord Tankerville says that—

> "The practical results which have been obtained by blending the blood of the wild cattle with high-bred shorthorns has been, in both the first and second crosses, to materially improve the shape of the animal,

and particularly to develop the loins and most valuable beef-producing parts, as well as to increase the size and weight. In addition to this, an increased aptitude to fatten and to attain early maturity is very pronounced. These are the qualities transmitted by the shorthorn, while the contribution of the wild parent is seen in increased vigour and constitution, with lightness of bone, together with improved gait, which is due to the finely laid shoulders of the wild animal. The colour may be said to be unchanged, with the exception of the nose and ears. In the former the black has given place to the flesh-colour or mottle, whilst the latter shows a broader fringe of red."

The Hamilton or Cadzow Park* cattle, which numbered 44 in the spring of 1889, and 38 (consisting of 22 cows, 11 bulls, and 5 one-year-old queys) in June 1892, are less timid than they were a generation ago, and are not nearly so shy as those at Chillingham; nevertheless, they cannot be driven from one field to another, but have to be trapped within a narrow space shut off by folding gates when they require to be moved. When seriously disturbed they show their nervous excitement by passing fæces of an abnormally liquid character; and, if the cows are suckling calves, by the derangement or death of a number of the calves, due to the heated and poisonous milk produced under the influence of fear.

When the animals are shot (the method adopted in killing them) the carcasses dress to about the same weight as those at Chillingham, both being smaller than an average specimen of the Ayrshire breed. The smaller-sized cows, killed in their natural condition after breeding, weigh as little as 16 stones.

In contrasting the two breeds, it is found that the Hamilton cattle, as compared with those at Chillingham, stand higher on their legs; their horns are lower set on the head, and are mostly inclined downwards through a part of their length, lessening the space left between the ear and the horn; and the hair on the body is purer white, or less

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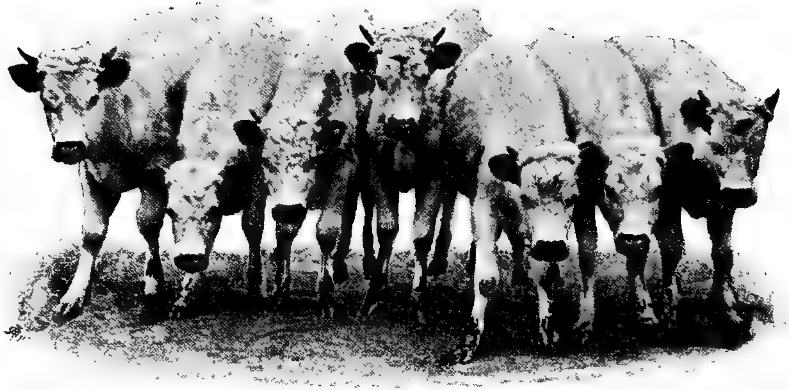
* Said to be a remnant of the primeval forest of Caledonia.

PLATE II.



WILD WHITE BULL CALVES—CADZOW FOREST, HAMILTON.
The Property of His Grace THE DUKE OF HAMILTON, K.T.

creamy. The jet-black tips of the horns, the dark eyes and black eyelashes, the black muzzle and surrounding ring of black hair, and the black knee-caps, hoofs, and stockings almost reaching the knee in front, give a more definitely marked appearance to the animals than the less prominent and less varied red-brown points of the Chillingham breed. It is well authenticated that till quite recently the Hamilton cattle were without horns. One old servant on the estate in 1889 recollected that the late Duke Alexander would not allow any calves that tended to grow horns to be preserved.

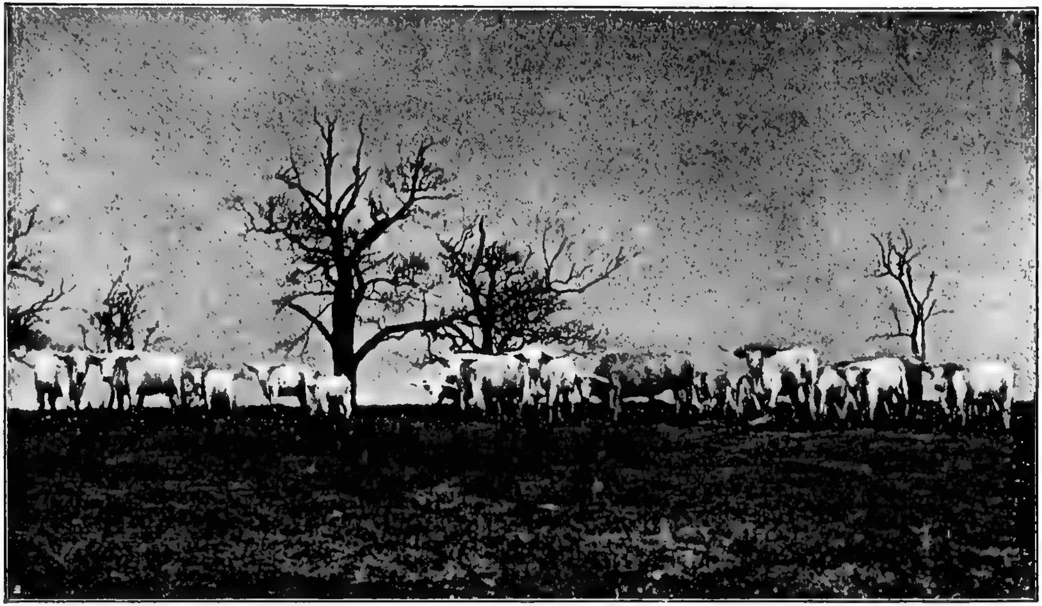
There is sufficient evidence indeed to show that the points and characters of the various herds of wild cattle have been kept constant or altered to suit the wishes of individual owners by artificial selection,—viz., by destroying those that did not conform to a certain standard. How far the present horned condition, or the late polled condition of the Hamilton cattle, can be attributed to this cause cannot now be determined. There is a tradition that a West Highland bull broke into the park, and that through his descendants, by selection, the cattle reacquired horns.

The numbers were reduced in 1866 by rinderpest to thirteen cows and a bull. In breeding up the existing herd, it has been impossible to kill off all animals with imperfect markings, so that in appearance the cattle are not now so uniform in type as it will be possible to make them within a few years. No doubt the herd has also suffered on account of closer in-and-in-breeding than before, due to the reduction of the numbers. This is to be inferred from the low condition of its members during winter in spite of the liberal feeding and care bestowed upon them. The constitution in this instance seems to have suffered more in the matter of hardiness required to resist the inclemency of the weather than in the powers of breeding, as no fewer than twenty-one cows out of a total of twenty-seven brought forth calves in 1888.

Hamilton-Chillingham Cross. — For the purpose of infusing new blood, a Chillingham bull was imported in 1886, and put to a selected number of cows. The products of the cross show some points of great interest to breeders of stock. Of six calves, the first product of this connection, four were almost pure white. In place of the black or red markings seen in their parents, they had extremely small fringes of coloured hairs,—not more than a quarter inch broad on the tips of the ears,—and these four animals were in consequence destroyed as unsatisfactory. One of the two remaining was black, and the other was red in its points like the sire.

In the following year, 1888, two well-marked bull calves were secured, and they have already exercised a salutary influence on the herd. So successful has the cross already proved to be that in 1891 all the cows, nineteen in number, were put to a half-bred Chillingham bull. Fifteen calves were born of this union, but only six possessed the characteristic markings of the Hamilton herd. Of the remainder eight were white, or nearly so, and one was black. The appearance of the crosses indicates a marked development of constitutional vigour and hardiness. They show a decided increase in size, and also in the amount and quality of hair, as compared with the pure-bred cattle. The heads are also larger, and the horns stronger and more upright, resembling the horns of the Chillingham herd. There is little doubt but that the step taken at Hamilton is one in the right direction, although the practice of killing off the badly marked calves may keep down the total number of the herd for a few years. Storer had, after a careful study of the whole question of breeding, excellent grounds for making the assertion, that he was of opinion "that no wild herd, if imprisoned in a park, and interbred for

PLATE III.



Chartley Park Wild White Cattle.

The Property of the Right Hon. Sewallis-Edward Shirley, Earl Ferrers.

several hundred years without a cross, could be in existence now."

The Chartley Park* Herd, in Staffordshire, belonging to Lord Ferres, now (1892) forty-one in number, dates back for nearly six and a half centuries to 1248-9.† The cattle in form, substance, and general appearance strongly resemble the longhorn breed, which at one time was largely represented in the English Midlands. The colour of skin and hair, including the udder and the tip of the tail, is white. The teats are black, and so are the points corresponding to those of the Hamilton cattle, but not quite so extended. The horns, which are long, white with brown or dark tips, descend in the manner of the horns of the longhorn breed. From the crown between the horns hangs down a top-knot of long white hair.

The herd further resembles that at Hamilton in not being so wild as the herd at Chillingham. The animals, however, exceed those of both the northern herds in size and substance, conspicuously in the weight of the forequarters. Black calves are at times dropped by cows of this breed, but are destroyed for the reason already stated in connection with the other breeds of wild cattle, viz., to preserve the characteristic colour markings. The average annual number of calves reared is ten, and the agents (John German & Son) say they "do not think that there is much deterioration in the character of the herd, owing to in-and-in-breeding," although "no other blood has been imported."

In Vaynol Park, near Bangor, is another herd of wild white cattle, with black points, which in 1892 numbered fifty-five, including twenty calves and two bulls. The following extract from *The Field* shows their origin to be Scottish:—

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* An area of nearly 1,000 acres in its original natural state.

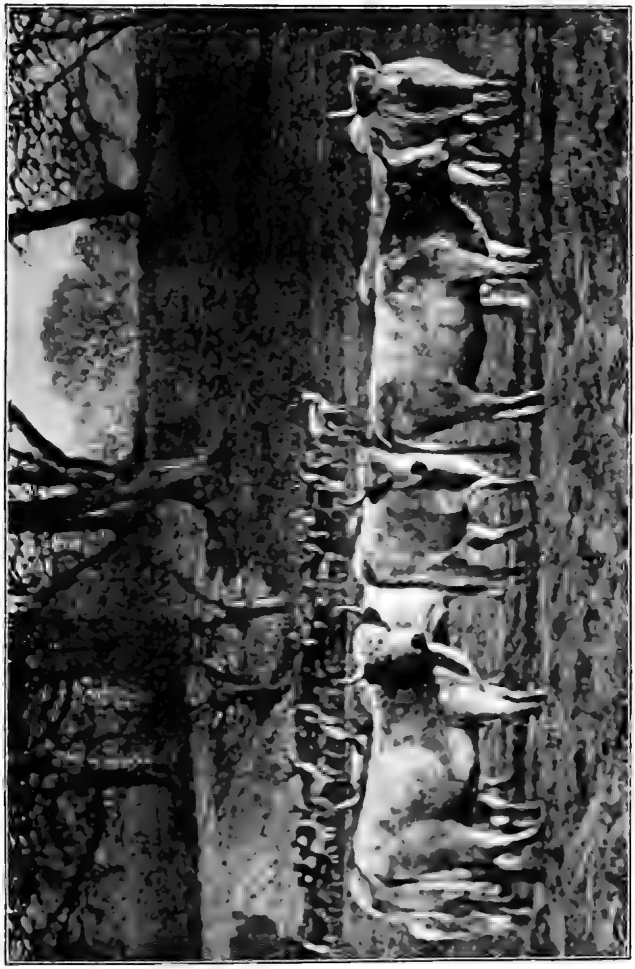
† Sir Oswald Moslay's "History of Tutbury," 1832.

"The herd at Vaynol Park, belonging to Mr Assheton Smith, was introduced there by him in 1872, when he purchased a portion (twenty-two) of the herd then owned by Sir John Orde of Kilmory, Argyleshire, from whom, in August 1886, he purchased the remainder, thirty-two more. This stock was originally at Blair-Athol, Perthshire, and in 1834 was sold to the Marquis of Breadalbane, Taymouth, and to the Duke of Buccleuch, Dalkeith. When the herd at the latter place was broken up, the late Sir John Orde purchased the only survivor, and transported it to Argyleshire. This was used with Kyloe (West Highland) cows carefully selected. After some few years this bull and Lord Breadalbane's Taymouth bull were exchanged, and the latter was used with good results until 1852, when a West Highland bull calf was bought, and this sire was supposed to have much improved the stock."

No fresh blood has been introduced since the transfer of the ancestors of the herd to North Wales. The number of calves is an indication that the cows are now normally fertile; although Sir John Orde, writing in June 1887, says that he made an attempt, although it proved unsuccessful, to introduce the Hamilton blood (through two bulls, which met with accidents, and were incapable), because he believed the herd had slightly declined in fertility, and had deteriorated in bone and horn. The type of the Vaynol cattle is very much that of the West Highland, with the substantial, well-formed body on short legs. The horns are intermediate in length, between the Hamilton and Chartley horns. Though the members of the herd trot off to a distance, should any one attempt to come to close quarters with them, they are not nearly so wild as the Chillingham cattle, and make no attempt to escape from the view of people at a distance. These animals are fed with hay during severe weather in winter, and are thus to some slight extent domesticated.

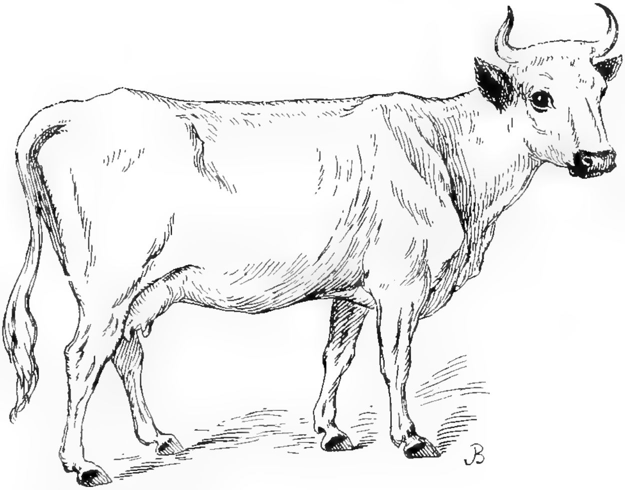
In the end of 1890 a heifer of this breed was captured after considerable difficulty, and sent to the **Zoological Society's Gardens** in London, where she was mated with a young bull from the Chartley herd. A fine strong bull

PLATE IV.



WILD WHITE CATTLE IN VAYNOL PARK, NEAR BANGOR

calf has been born of this union, perfectly white, with jet-black nose and ears. "Both the adults and the calf are wonderfully tame, and will lick or feed from the hand, or allow any one to pat or stroke them without exhibiting fear or anger." It would thus seem that the common belief in the untamable nature of the wild white cattle of this country is unwarranted.



Cross-bred Cow, showing reversion in colour to the colour of the ancient wild cattle: referred to on page 55. *Drawn by Mrs Blackburn.*

CHAPTER III.—BREEDS OF DOMESTIC CATTLE—THE SHORTHORN.

Points generally applicable to Cattle kept for Beef Production—The Shorthorn—Colour—Horns—Descent from the Old Tees-Water Breed—Milking Qualities—Inferiority of White Specimens—Tradition relating to History—Charles and Robert Colling—Milking Powers lowered by "In-and-in-Breeding"—Influence of Change of Country or Locality on Constitution—Two great Branches of Shorthorns, "Booth and Bates"—The Booths—Thomas Bates—Comparison of Booth and Bates Cattle—Commingling of Booth and Bates Blood—Recent Breeders—Aberdeen Shorthorns.

BRITISH **Cattle** in common with other European cattle are scientifically classified under the designation *Bos taurus*.

Before describing the distinguishing characteristics of the different breeds it will be well, in order to avoid repetition, to briefly state the general points applicable to those kept for beef production.

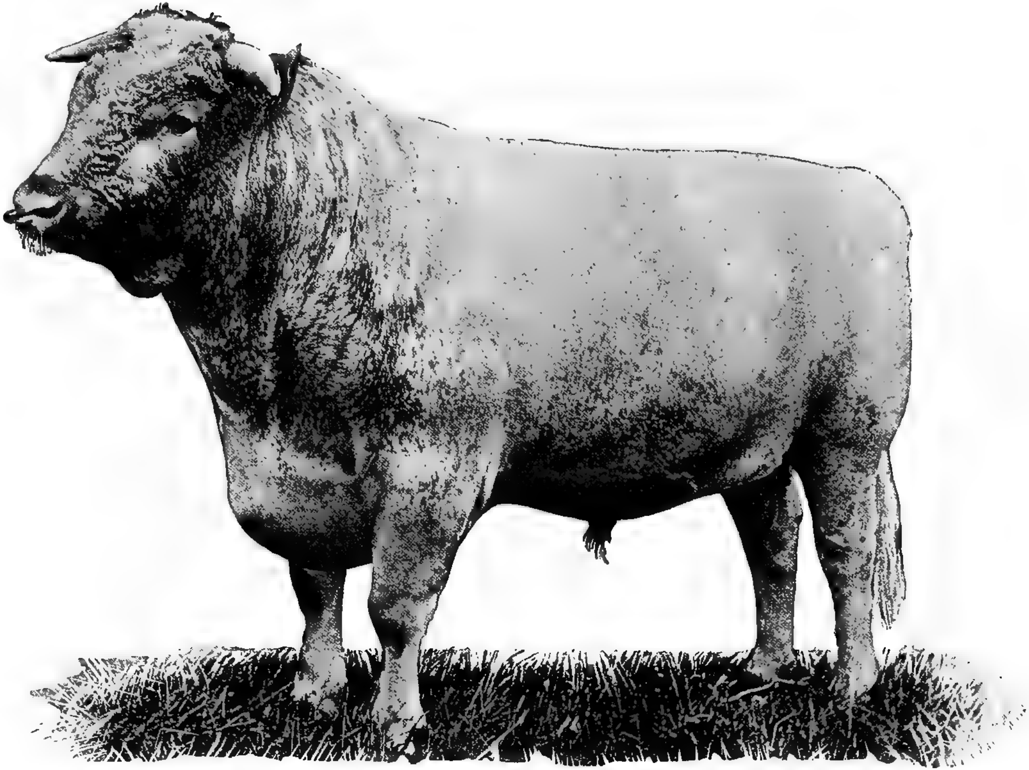
GENERAL POINTS.

Head broad between the eyes, flat across the *crown* (with a few exceptions in polled breeds) and down the *face*, which should be neither "dished" nor Roman, and of medium length; *muzzle* broad, full, distinct, and dewy; *eyes* large, full, and clear; *horns* none, or varying in length, colour, and strength, according to breed, set on the crest of the head; *ears* full and sensitive, well covered with hair, and varying slightly in position in the different breeds.

Neck lengthy, full at the "neck-vein," or where it joins the body, broad (muscular in the male), but fine, and tapering towards the head—to which it should join without thickness or chokiness—and straight from the shoulder top

N.B.—For a list of the various herd-books see Appendix C.

PLATE V.



Champion Shorthorn Bull at the Royal Agricultural Society's Show in 1888, "Mario," 51,713.
Bred by Wm. Duthie, Collynie, Aberdeenshire.

to the roots of the horns, excepting when it rises into the crest of a bull.

Body long and deep, equally balanced before and behind; *back* broad throughout its length, and straight from the top of the shoulders to the tail-head; the *frame* well and equally covered with flesh, not patchy on the hooks, tail-head, rump, shoulders, or other parts (when prime, a little pit may be felt on the point of each hook). The *trunk*, looked at from any point, should resemble as nearly as possible a parallelogram; the under and upper *lines* straight and parallel; *brisket* projecting well forward, and wide, making the fore-legs stand well apart; *tail* thin, set on well back (but not too high), and falling perpendicularly.

Skin moderately thick (not papery), loose, and mellow or mossy to touch; *hair* soft and abundant, covering all parts well.

Shoulders laid well back over the ribs, so that the natural depression behind them in the region of the girth line should not be too pronounced; broad above, between the upper edges of the shoulder blades.

Chest full, wide, deep, and massive.

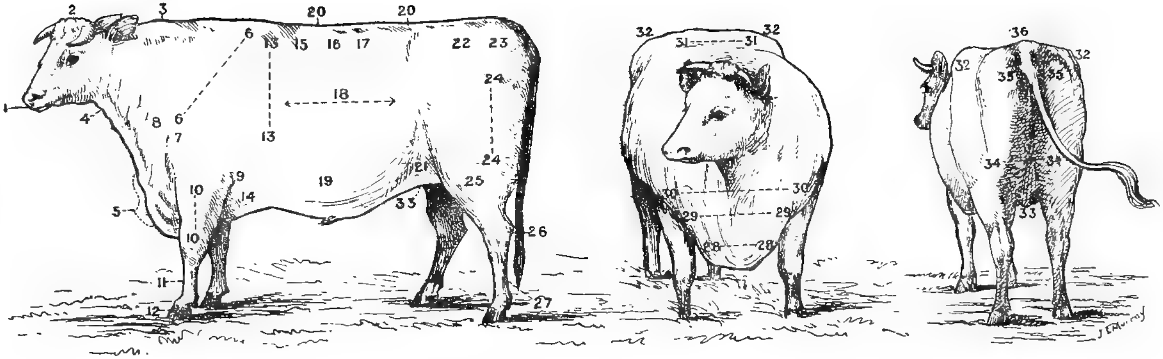
The Fore-arm and Leg straight and short; *muscle* large and broad; *leg-bones* strong, though fine and flat (abnormally small bone shows tendency to diminished size); *legs* well under the body; *hoofs* clear and oily.

Hind Quarters full and well packed, lengthy from the hook bones to the tail-head, neither of which should rise above the back level; *thighs* broad, thick, and well down towards the houghs; *twist* or inner thigh full and large.

Ribs well sprung and deep, filling up deficiency behind the shoulder and in front of the *hooks*.

Fore Flanks and Hind Flanks full and deep.

The Lines of the body flowing, not sharp or abrupt, with a general balance of parts to please the eye.



FIGURES ILLUSTRATING THE POINTS OF AN OX.

1. Muzzle.
2. Poll.
3. Crest.
4. Throat.
5. Dewlap.
6. Shoulder.
7. Shoulder Point.
8. Shoulder- or Neck-Vein.
9. Elbow.
10. Arm.
11. Shank.
12. Hoof.
13. Crop.
14. Fore-Flank.
15. Fore Ribs.
16. Mid Ribs.
17. Back Ribs.
18. Barrel.
19. Belly.
20. Spine.
21. Flank.
22. Plate.
23. Rump.
24. Hip.
25. Thigh.
26. Hough.
27. Hind Leg.
28. Brisket.
29. Bosom.
30. Chest.
31. Loins.
32. Hooks.
33. Purse.
34. Twist.
35. Pin Bones.
36. Tail Head.

A Brief Historical Sketch of Breeds mainly valued for Beef Production, together with their characteristic Points and Qualities.

THE SHORTHORN.

Is the most widely distributed and numerously represented of all British breeds, not only in the United Kingdom and her colonies, but also in the United States of America. It has among its many good qualities a marvellous power of adaptation to climatic and other local surrounding conditions. In connection with the general form above described the following special characteristics are worthy of notice.

In colour the breed is represented by roans and reds of various shades, light and dark, and also by red-and-white as well as wholly white specimens. The last-mentioned and also the light or yellowish-light reds are out of fashion with American buyers, who, on account of their numbers, tend to regulate custom in such things. Brindled colours are not seen in pure-bred shorthorns, and the same may be said of black. The skin, including that of the inner ears, is of a creamy-white or yellow colour. The nose, palate, lips, and eyelids should be flesh-coloured, and free from dark markings. A bright red nose is indicative of delicacy, just as black is considered to denote impurity,—this, too, in spite of the acknowledged fact that black or dark noses existed in some of the best strains of blood mentioned in the early records of the breed. "Foljambe," a descendant of the famous bull "Hubback," had, on the authority of Bates, a dark nose; and another good bull was designated the "black-nosed." It is also further recorded by Allen that at one time "farm stock was nearly all black-nosed."

The characteristic horns are short and blunt, more or less curved in a downward direction, of a waxy yellow throughout (free from black tips), laterally flattened, and set on wide apart.

It is essential that the **masculine** or the **feminine characteristics** should be naturally represented in individual specimens of each sex.

Shorthorns are descended from the old North-East of England breed, variously designated the "Durham," "Tees-Water," "Yorkshire," or "Holderness." It was probably originally formed several centuries ago by crossing the aboriginal British cows with large-framed bulls imported from the Continent—Holland and Denmark. The dark noses referred to were no doubt due to their relationship with the ancient white cattle. Early shorthorns were good milkers, and it may be presumed they in part inherited that quality along with the shortness of horn from their Continental ancestors.

The "Alloy" strain, which was represented by thirteen animals of good appearance at the retiring sale of Charles Colling, was descended from the produce of a red cow (Lady), which had one-eighth part of Galloway blood, repeatedly in-and-in-bred with the best shorthorn bulls. The distinct Galloway characteristics rapidly disappeared in the full flood of shorthorn blood ; still the animals retained a roundness of form, roughness of coat, heaviness and uniformity of flesh, and deficiency in their milking powers not usually found in the shorthorns of that time.

The colours of the early shorthorns were much like those now prevailing. Among red varieties the yellowish-red is waning before the deep or darker red colours. This yellowish tint seems to have been more or less correlated with **good milking** qualities possessed by early shorthorns, and to have disappeared with the increasing tendency in the breed to produce fat, acquired at the expense of their milking powers. The fact that the light red non-pedigreed shorthorn cow with a slightly orange tinge is, as a rule, more highly appreciated by dairy people than the dark red, goes to support this view. **The milking shorthorns** (not pedigreed, though well bred) necessary for the milk supply of Edinburgh and other large centres of population in the north of the kingdom, are largely drawn from Cumberland. They are excellent milkers, and possess, in many cases in a marked degree, the light red or yellowish-red which is held to be associated with milking powers. Thornton's "Circular" says that in the Lake district "the yellow roan and red were" (in the early part of this century) "looked upon as the pure breed, the dark red being held in no favour." The colour of "Hubback," the famous bull from which all the best shorthorns have been bred, was "yellow-red and white;" and Carr, writing of the first of the Strawberry tribe, says they were "of that *yellow-red and white hue*, which, though out of favour at the present day, *was then the prevailing colour* of the shorthorn."

That colour is to some degree an indication of milking qualities is beyond reasonable doubt. A careful inquiry among "town" dairymen, whose cattle are treated by forcing in a manner calculated to try the weak points of all constitutions, shows that it is a pretty widely accepted belief that white shorthorns are not so hardy nor so good as milkers as those of other colours.* The fact that a white cow may in a rare and special case be second to none in a whole herd as a milker does not interfere with the general belief in the principle laid down. It is a parallel to the old story of the black sheep of a flock being either conspicuously good or exceptionally bad.

This point is of special interest when considered in connection with a statement made in Thornton's "Circular" (1869) in reference to the effects of the Collings' system of breeding, that "in all cases of close affinity there was a tendency to white, with red ears and spots." Is it possible that many of the pale cattle of the present time are suffering not from the effects of close-breeding of recent date, but from the effects of it in the past, in virtue of the relaxation of the intensive accumulation of good qualities which are associated with judicious in-breeding when recently carried out? If this be so, we have one explanation of the decided preference of American and other purchasers for roan or for dark colours. It may also be that light-skinned cattle are more liable to suffer from sunburning in the United States, where solar influences are more powerful, than in this country.*

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* Storer, in speaking of the cattle of England, Scotland, and Ireland, says:—"The white cow is despised and charged with delicacy."

Little is known of the breed, except from the uncertain authority of **tradition,** down to the early part of the eighteenth century, though it is only right to infer that long before this time great care, and even skill, had been bestowed upon it. The earliest records show that purity of breed was fully appreciated, and this important fact could not have been universal without previous experience and attention. Though the first volume of the "Shorthorn Herd Book" was not published till 1822, yet, for well-nigh a century before that date, pedigree records, of a more or less imperfect kind, had been kept of a few of the best bulls.

Charles and Robert Colling,† who have been called, rather misleadingly, "the founders of the shorthorn breed of cattle," did much to improve the quality and to extend the fame of this hitherto local breed by what may be termed Bakewell's ‡ method of breeding, which might be briefly defined as a persistent system of "in-and-in-breeding" with specially selected and carefully mated animals of good blood. The brothers, though admittedly excellent judges and managers of stock, yet owe, in a great measure, their success and the name they have handed down to posterity to their methods of bringing their animals to the notice of the public. Two famous beasts—the "Durham Ox," with a live weight of fully 1½ tons, and the "White Heifer that travelled," which weighed considerably over 1 ton—were carried about the country for a number of years, and exhibited as marvellous specimens of the wonderful breed with which the name of Colling became familiarly associated.

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* This subject of the importance of the natural colouring of the skins of cattle is exhaustively dealt with in the Author's work on Indian Agriculture. Oliver & Boyd, Tweeddale Court, Edinburgh.

† Charles, born 1750, died 1836; Robert, born 1749, died 1820.

‡ Robert Bakewell, born 1725, died 1795.

The hiring out of bulls, a common practice of the present day, though new at their time, kept the Collings in communication with the best breeders. Intent upon the improvement of the external form and the increase of fattening powers in their stock, they were no doubt satisfied with the results of the cross with the in-and-in-bred Colling bulls, that had acquired, in virtue of consanguinity, an intensified power of impressing their qualities upon the ordinary shorthorn of the country. And, finally, the sales* held respectively by the brothers circulated their names and distributed their famous strains of blood among the important breeders of shorthorns.

Though **in-and-in-breeding** has admittedly done much to raise the standard of the shorthorn breed, there is a strong presumption that close-breeding of itself, apart altogether from its tendency in this case to develop flesh, has to do with the acknowledged lowering of the power of milk production. It is a well-established fact, that persistent in-breeding leads to impotency in the matter of conception. It is true that shorthorns are not so liable to suffer in this way as some other classes of stock; yet Charles Colling must have felt the tendency when, after trying his cow "Phœnix" with good bulls without success, he fell back, as a "last resort," on a bull which was one-fourth Galloway and three-fourths shorthorn, and attained his end. This was at one with the common custom of putting a good country or common bull to a well-bred stock of cows which have through close-breeding become weak in their powers of reproduction. It is admitted that close-breeding lowers the power of animals to produce young, and it is not wonderful to find it also impairing the power of providing sufficient milk to support them should they come into existence. It would be extraordinary if the reproductive system were seriously affected as regards its first functions, and left in a normal condition in the matter of what should follow at a later period.

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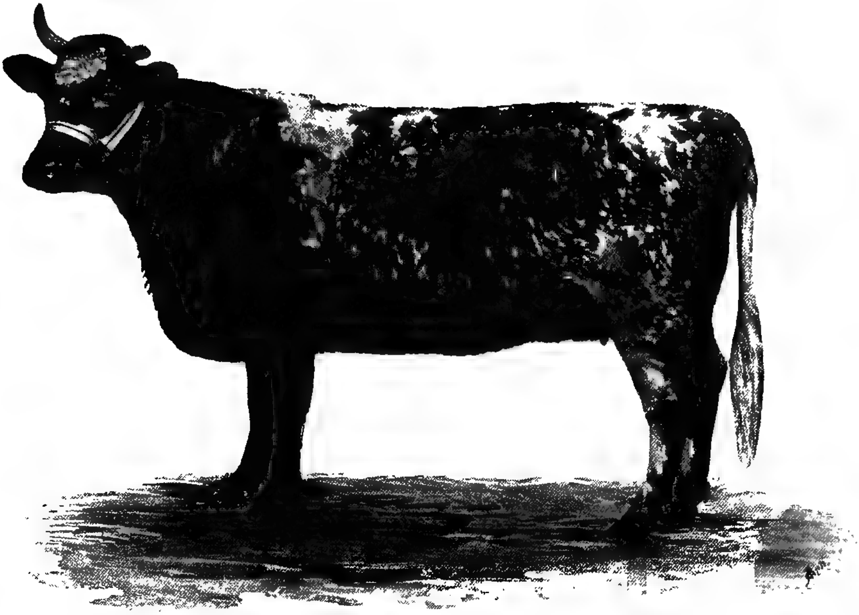
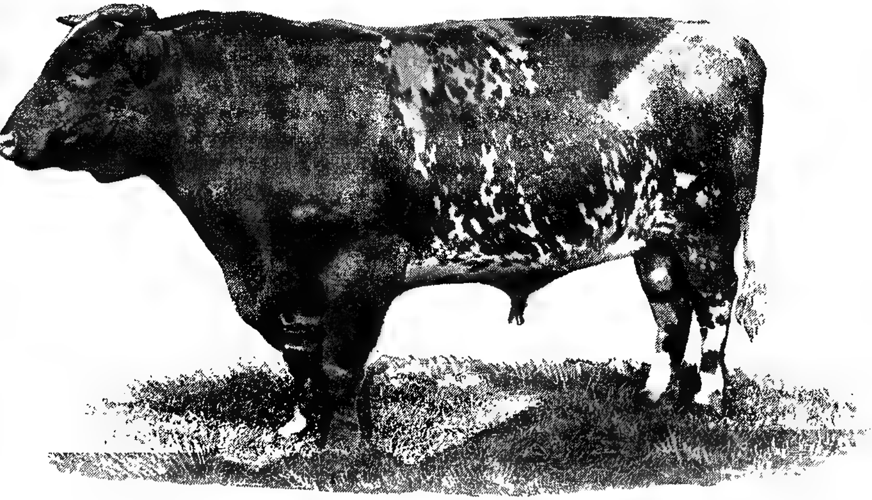
* That by Charles at Ketton in 1810, and that by Robert at Barmston Farm in 1818, besides a displenishing sale at the latter place in 1820, after Robert's death.

There were several circumstances in the management of the early shorthorns which made it possible to carry in-breeding to its greatest length with the minimum of bad results. Animals were kept in moderate condition and in a natural state. Their food was mostly grass in summer, and hay or straw in winter. The system of letting out on hire lent renewed vigour of constitution through change of air, food, and general surroundings. The influence of such change as a precaution towards the preservation of health is universally admitted in the human species; and in the matter of consanguinity, it has been shown that the offspring from the marriage of cousins is not associated with either mental or physical weakness if the individuals in question have been reared in parts geographically distant from each other. The shipment of cattle to America and other countries, and the return of their progeny, has unquestionably increased their constitutional vigour. The same remark applies to the more frequent transfer and return of shorthorns to Scotland and Ireland. The influence is not one



A.—SHORTHORN HEIFER, "BRACELET," 4030.
The Property of Her Majesty THE QUEEN.



B.—BOOTH SHORTHORN BULL, "ROYAL STUART," 40,646.
Bred by BOOTH, of Warlaby, Northallerton.

which shows itself merely in the members of a race of descendants, but it is conspicuous in the individual. Numbers of highly-bred barren cattle, exported to America at low prices, have been found to conceive without difficulty after the change.

It may be safely asserted that nearly all the well-bred shorthorns which have become famous within the period of which there is any written history* of the breed, have been descended more or less directly from a few famous bulls, notably " Hubback " (calved about 1775), the father of the improved shorthorn, and his much in-bred descendants " Favourite " (252) and " Comet " (155).†

In "Animals and Plants under Domestication," Darwin says of " Favourite " (who was himself the offspring of a half-brother and sister from " Foljambe ") that he " was matched with his own daughter, grand-daughter, and great-grand-daughter, so that the produce of this last union, or the great-great-grand-daughter, had fifteen-sixteenths, or 93.75 per cent., of the blood of ' Favourite ' in her veins."

The two great branches of the shorthorn breed, the " **Booth** " and the " **Bates,**"‡ had a common ancestor in " Hubback." This animal had a marvellous power of stamping his special characteristics upon his offspring, and moreover, was possessed of certain qualities, now highly appreciated among shorthorns, which were not prominent features of shorthorns before his time,—viz., low legs, compact form, and moderate size;* a wonderful aptitude for laying on flesh, which, contrary to the results of the usual law of in-breeding, he seems to have inherited from his dam; and, to the touch, a superior quality of skin and hair.

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* George Culley, who wrote on the agriculture of Northumberland, and also "Observations on Live Stock, 1786," is one of the first historians of the breed. He was an intimate friend and adviser of the Collings, and an enthusiastic disciple of Bakewell.

† These were descended from " Studley bull " (626), calved in 1737.

‡ Though not here dealt with in detail, there are other important branches of shorthorn blood in the United Kingdom : for example, Collings families of shorthorns exist, which neither Bates nor Booth ever possessed. There are also the Wilkinson shorthorns, well known in Scotland ; the Mason families, highly appreciated in Scotland, England, and Ireland ; and the Knightl y strains, famous for their milking qualities.

The name of Booth has been associated with the breeding of shorthorns since 1777 in the person and in the descendants of Thomas Booth, the father of Richard and of John Booth, and through the latter grandfather to Thomas C. Booth of Warlaby, Northallerton, and great-grandfather of Richard Booth, the present representative in the direct line.

It was not till some time after the Collings' career that the name assumed the importance which it ultimately attained in the shorthorn world. "Killerby," "Warlaby," and in earlier times "Studley," were the centres from which the various members of the Booth family distributed their surplus stock to all quarters of the globe where shorthorns are to be found. The Booths, like the Collings, continued the system of in-and-in-breeding, and also that of letting bulls out on hire for a time to distant parts of the British Isles—a practice which has been acknowledged as of much advantage when the system of close-breeding is adopted.

Thomas Bates (1775 to 1849) of Kirklevington,† in the Vale of Cleveland, got the progenitors of his best cattle from the Collings. He was a man of means, and had an education‡ superior to that of his farmer neighbours. His cattle

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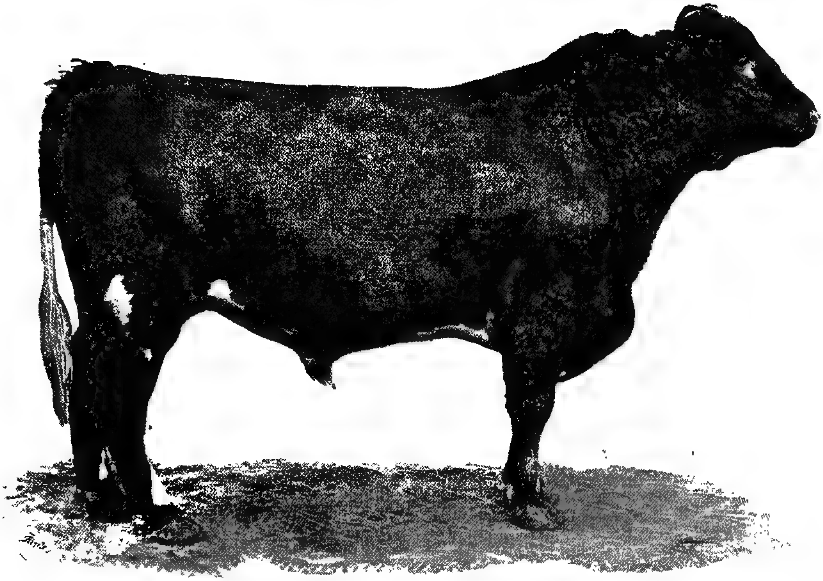
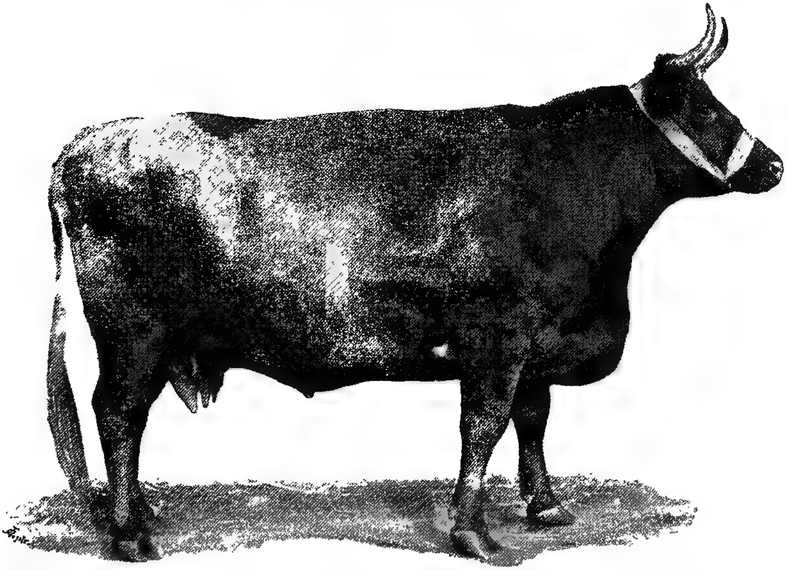
* Various records of the weights of large-boned and coarse-fleshed early shorthorns, prior to the days of high pressure in feeding, put the dressed carcasses at over 150 imperial stones.

† A rather over-drawn and laudatory account of the cattle bred by him is to be seen in a book published in Newcastle-upon-Tyne, *N.E. Farmer* Office, and entitled "The History of Improved Shorthorn or Durham Cattle and of the Kirklevington Herd, from the Notes of the late Thomas Bates, with a Memoir by Thomas Bell of Brockton House, Eccleshall, Staffordshire."

‡ He spent a number of years at the University of Edinburgh, with the original intention of going in for the Church.



A.—Bates Shorthorn Bull, "Duke of Barrington," 15, 52,745.
Bred by H. J. Sheldon, Brailes, Shipston-on-Stour.
The property of T. Holford, Castle Hill, Cerne.



B.—Bates Shorthorn Cow, "Duchess of Leicester II."
Bred by T. Holford, Castle Hill, Cerne.

breeding was carried out more for his own pleasure, and to establish a distinct breed and name, than for profit. His name is most familiarly associated with the "Duchess" tribe, for which was claimed all the qualities, including that of milk production, which the shorthorn breed possessed. The "Oxford" and "Duchess" tribes are the two important branches of the Bates blood; and these are most intimately related through frequent intercrossing by bulls taken from the one to the other. Even a more perfect system of in-and-in-breeding was followed by Bates, and continued by his successors, than in the case of the Colling or of the Booth cattle. The colours of Bates cattle are red, red and white, and roan. It is asserted by Bates breeders that white specimens more rarely appear in this than in the Booth line; so it would seem that the tendency to whiteness through close-breeding is overbalanced in this instance by some other influence—possibly the greater attention of Bates breeders to select dark-coloured bulls for service. The "Stanwick" cow, which was the mother of all the best of the Bates breed, was a yellowish-red roan. Though good milking power has always been considered a point of importance in Bates cattle, the fact that the common non-pedigreed shorthorns surpass them in this particular quality, is an indication of the influence of close-breeding on the alimentary section of the organs involved in reproduction.

In comparing Booth with Bates cattle, we find that the Booth breed exhibits a greater number of light-coloured specimens—white, and light roan; a thicker and less silky skin; a more substantial and massive frame, more deeply covered with flesh; the head and neck set on lower, and the style and expression more sombre, than in the case of its stately rival. The best specimens of the Bates bulls possess a wonderful presence, given by the arched crest and stylish head. The breed is particularly liable to the defect of a hollowness, or falling away, at the heart girth; this is made all the more apparent by the high neck and the frequently perpendicular shoulders.

Commingling of Booth and Bates blood is strongly objected to by some, on the ground that the strains are now so distinct that the drawbacks of an ordinary cross with animals of entirely different breeds are liable to appear. It is acknowledged that, where inter-breeding does take place, the most successful match is a Booth bull with a Bates cow. This result implies that Bates cattle have suffered more from in-and-in-breeding than Booth cattle, because had consanguinity not been carried too far, we should have expected greater potency to remain with the Bates which are most in-bred. In America the prices paid for Bates cattle have been quite phenomenal.* There, as in our Australian colonies, Bates cattle are much preferred to Booths.

It would be impossible to enumerate all of the many hundreds of breeders who have followed in the lines laid down by the Booths and by Bates.

A few of the more prominent breeders of Booth cattle—in addition to the Booths of Warlaby,† whose herd, though not often represented in the show ring, still maintains the position of excellence to which it was raised by its late owners, Richard and T. C. Booth—are, T. H. Hutchinson, Manor House, Catterick; Thomas Willis, Manor House,

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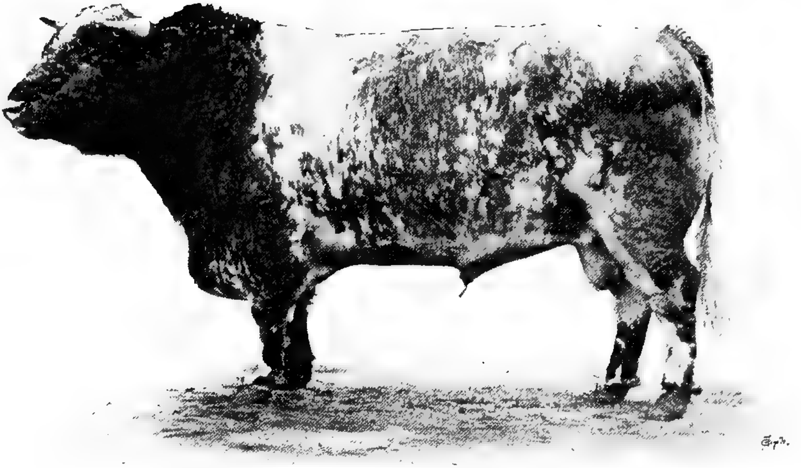
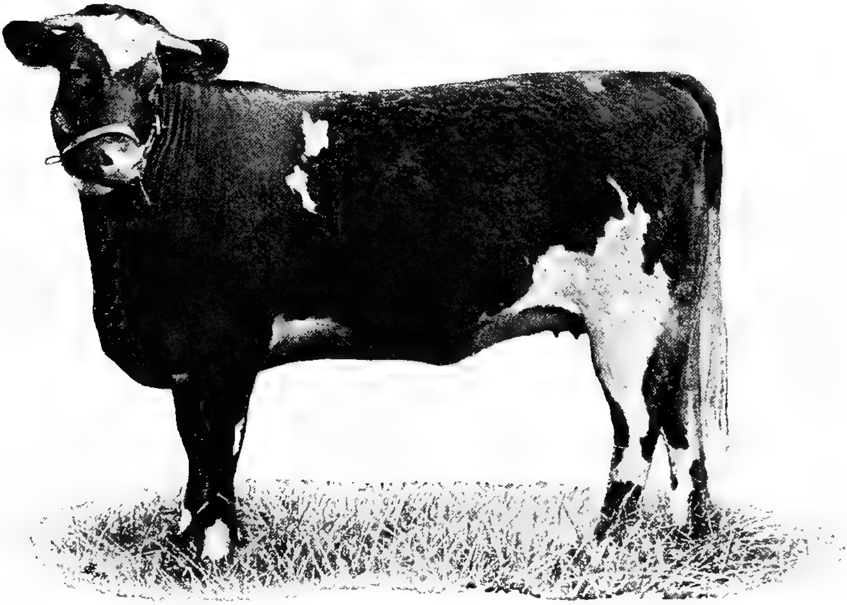
* When in Canada, in 1879, the Author saw in the possession of M. H. Cochrane, Compton, Prov. Quebec, the famous "Duchess" cow, which at that time had (speaking from memory) bred stock sold at £27,500, and which lived to add over £2,500 to that enormous figure. At the New York Mills Sale, in 1873, ninety-three cows and heifers averaged £791. 8s., and sixteen bulls averaged £403. 16s., making a total of £80,061. 9s. Fifteen specimens of the Duchess tribe of T. Bates averaged £3,679. 18s.

† The second Killerby herd was sold off in October 1886, after the death of its owner, J. B. Booth; and we may be excused for adding, from personal experience, on one of the wildest days of wind and rain that recent years have seen.



A.—ABERDEEN SHORTHORN BULL, "FIELD MARSHAL," 47,870.



B.—MIXED BOOTH AND BATES HEIFER, "AUGUSTA IV."
In 1884 First at the Royal Show, and Champion Prize of £50 at the Highland Show for the best Female Shorthorn. Sold to HOPE, Bow Park, Ontario.

Carperby, Bedale; Robert Thompson, Inglewood, Penrith; E. Heineman, Lamorby, Kent; Lord Polwarth, Mertoun, St Boswells; W. Talbot Crosbie, Ardfert Abbey, Ireland; R. Welsted, Ballywalter, Ireland; Hugh Aylmer, West Dereham Abbey, Norfolk; the Duke of Northumberland, Alnwick Park, Northumberland; R. Pindar, Whitwell, Oakham; Alfred Darby, Little Ness; Geo. Yeats, Studley, Ripon; H. Fawcett, Old Bramhope; and Christopher Cradock,* Hartforth, Richmond.

Bates breeders of similar rank to the foregoing are less numerous, but are well represented by the Earl of Feversham, Duncombe Park, Helmsley; the Hon. Victor Cavendish, Holker Hall; the Earl of Bective, Underley Hall; T. Holford, Castle-Hill, Dorset; Philot L. Mills, Park, Ruddington Hall, Notts; H. J. Sheldon, Brailes House, Warwickshire; Joseph Harris, Calthwaite; Herbert Leney, West Farleigh, Kent; Evan Baillie, Filleigh, Devon; Sir John Swinburne, Capheaton, Newcastle-on-Tyne; C. R. Lynn, Stoxton; and Col. Gunter, M.P., Wetherby. In addition to the herds of the breeders named, those belonging to H.M. the Queen, at Windsor, and H.R.H. the Prince of Wales, at Sandringham, containing some of the most celebrated specimens of Booth and Bates shorthorns now living, should not be forgotten.†

The Aberdeenshire shorthorns—with which the names of Cruickshank, Sittyton (whose herd was dispersed in 1890); William Duthie, Collynie; W. S. Marr, Upper Mill; S. Campbell, Kinellar; and J. Bruce, Inverquhomery, are intimately associated—have been rapidly growing in the favour of North American importers, and in importance in the show-yard. Though "Mario" (51,713), who took the Champion prize at the English Royal Agricultural Society's

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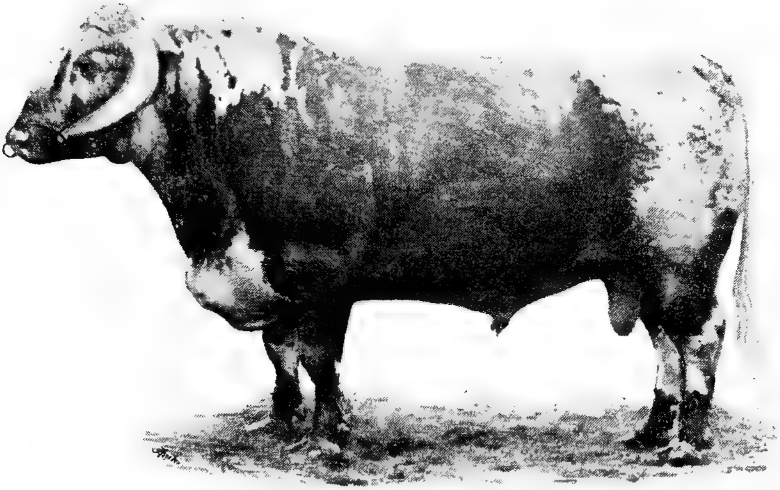
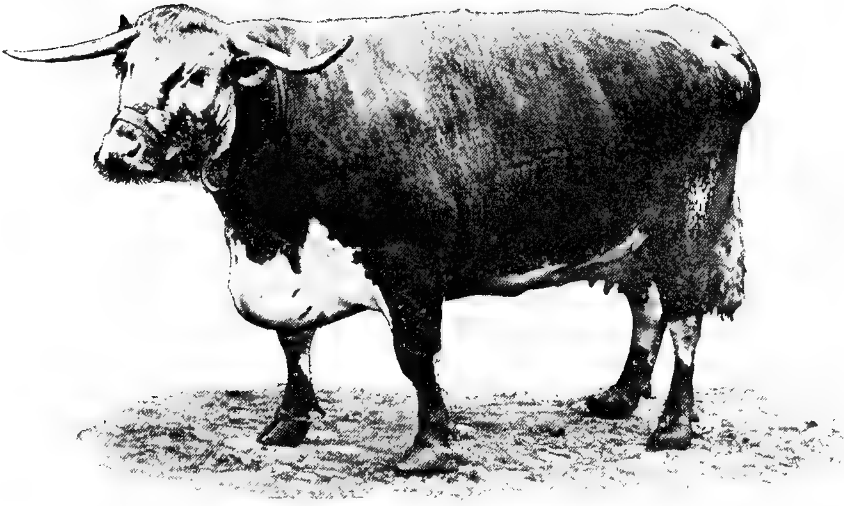
* This gentleman still possesses the descendants of the old "Cherry" tribe, perhaps the only tribe mutually "recognised" by Booth and Bates breeders.

† Scotch shorthorns are equally well represented at Windsor.

Show in 1888, could not be selected as a typical shorthorn, nor meet the touch of a South-country breeder with perfect satisfaction, yet he had much of the substance and quality that butchers appreciate. It will be interesting to mark the career of these North-country cattle. They have arrived at their present position by another course than that of persistent in-breeding, and it remains to be seen if the constitutional gain is not thereby of greater value than we at present anticipate. Much of the Booth blood has no doubt been from time to time absorbed by the northern breeders, but this does not necessarily imply close-breeding; and, moreover, the animals selected had the invigorating influences of the change of climate and surroundings. Cruickshank, writing on this question, makes some remarks well worthy of notice and consideration. He says: "Aberdeenshire breeders have in nearly all cases been tenant farmers, who are dependent on their skill and success for their daily bread; their customers have generally been their own neighbours, who are raising cattle for the butcher, and hence the breeders have been pulled up in any course which has been proved to result from an error of judgment by the most imperative of all necessities."—*From a private communication addressed to the Author.*



A.—LONGHORN BULL.
Was the Property of His Grace THE LATE DUKE OF BUCKINGHAM AND CHANDOS.



B.—LONGHORN COW.
Was the Property of His Grace THE LATE DUKE OF BUCKINGHAM AND CHANDOS.

CHAPTER IV.—BREEDS OF DOMESTIC CATTLE—THE LONGHORN, HEREFORD, DEVON, AND SUSSEX.

The Longhorn Breed—Low on its Habitat—Bakewell—General Points—Colour—Distribution of Hereford Cattle—Relationship to other Breeds—Points of Special Interest—Origin of the Colour of the Modern Hereford—Benjamin Tomkins—John Hewer—Herefords poor in Milking Qualities—Herefords as Work Oxen—The Devon Breed: Two Branches—The North Devon—Early History—The Somerset Type—The South Devon—The Sussex Breed—Low's Explanation of their Geographical Position—The Cattle of the Interior—Similar Conditions in India—The Sussex Breed—Size—Influence of Soil and Climate—Bullocks as Work Oxen—Distribution of Breeds in this Country and in India.

THE LONGHORN BREED.

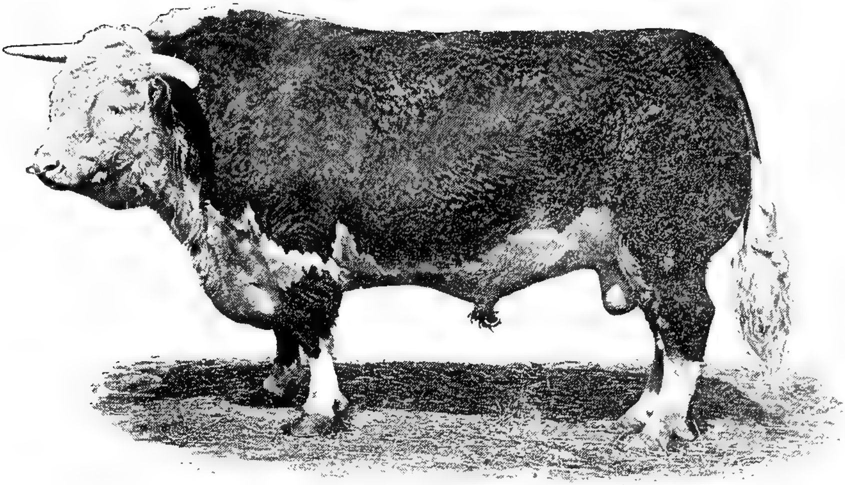
AS now seen in this country, the Longhorn breed is a remnant of a breed which at one time held a position of considerable importance as a milking breed and as a producer of large carcasses of coarse beef.

Low, in his "Domesticated Animals," says, "The true longhorns seem to have been the inhabitants of the western parts of the British Isles." In early times they were spread not only over Ireland, but throughout the English Midlands and the northern counties, extending in virtue of their hardiness on to the exposed hilly regions. The district of Craven in Yorkshire has been specially mentioned, in the records of the early improvement of the breed, as noted for the production of good specimens, though Low says "Lancaster was the nursery of the breed."

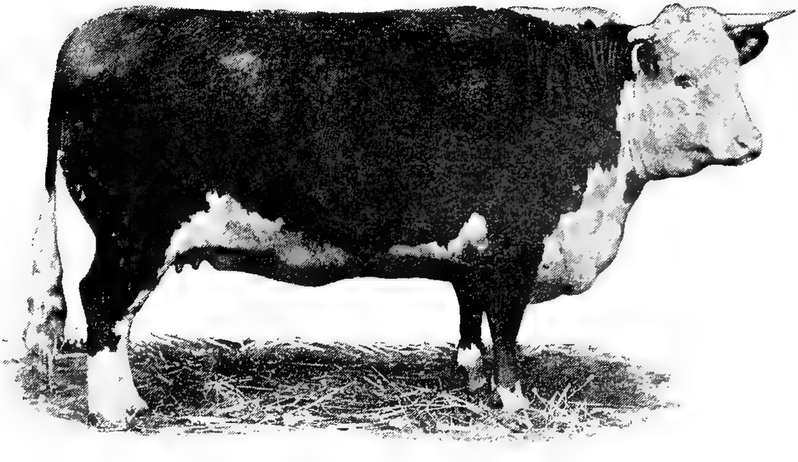
Robert Bakewell of Dishley, Leicestershire, the great originator of the system of improvement of live stock by in-and-in-breeding, selected the longhorn among cattle upon which to carry out his operations. His object was to increase the rate at which they come to maturity, to improve the quality of flesh, and to reduce the size and coarseness of bone. In this, so far as his own cattle were concerned, he succeeded admirably, but at the sacrifice to some extent of the powers of milk production.

He died at the age of seventy, in 1795, without transmitting the secrets of his system, or recording the lessons he had learnt from the experiences of his extensive breeding experiments, and consequently the work which he had begun so well was not carried to a successful issue. The breed which he made famous has been, since his death, seriously worsted in competition for public favour by its shorthorn rival, which has threatened it with extinction. The unique characters which are peculiar to the longhorn breed will, however, retard or prevent their disappearance, by creating a demand for them as more or less fancy animals. The Herd Book, established in 1880, has now been discontinued.

In general points, including size, form, and mildness of disposition, they strongly resemble shorthorns. They differ from the latter in being coarser in bone and in the quality of their flesh, in now possessing, in spite of Bakewell's early success, less aptitude to fatten or come to maturity, and in the greater length and strength of horn. The long, irregularly shaped, sweeping horn forms the most striking difference, and one the origin of which is not easily explained. It would seem that the longhorn inherited its horn-development from the *Bos primigenius*, through its more immediate ancestors the wild forest cattle, as represented in the Chartley Park breed—probably from a variety with exceptionally long horns. The shorthorn, on the other hand, no doubt derived its characteristic form of horn from its imported European ancestors.



A.—HEREFORD BULL, "RARE SOVEREIGN."
The Property of the Right Hon. THE EARL OF COVENTRY.



B.—HEREFORD HEIFER, "PRIMROSE."
Champion Hereford at Birmingham and London, 1888.
The Property of EDWARD CADDICK, Caradoc, Ross.

The colours of the longhorn may be said to be those of the shorthorn with "brindles" added. There is also a decided tendency to the appearance of a white ridge along the back.

THE HEREFORD BREED*

Is not only one of the most picturesque, but also one of the most valuable, and, in a cosmopolitan sense, one of the best known British breeds. Although in this country it is distinctly a local breed, yet in America and Australia it has become widely distributed and highly and justly appreciated. It appears that all the highest authorities are agreed that on at least one side of its ancestral descent the Hereford breed is closely connected with other British breeds—such as the Welsh, the Devon, and the Sussex—which still possess certain characters in common with the breed under consideration.

The points of special and peculiar interest in the Hereford are, that the face and the forward part of the back, as well as the throat, belly, inside and lower parts of the legs, and the tip of the tail are white, the greater part of the body being red or brown, varying from a light to a dark shade. The shoulder is particularly neat, and well covered with flesh; and the twist is also good. The great defect of the Hereford breed is its want of internal fat in proportion to its external appearance when ready for the butcher—*i.e.*, it is defective in internal "making-up." The setting on of the tail is also frequently defective as compared with that of the shorthorn. The muzzle is flesh coloured; and the horns are black tipped, of medium length, and in the female they incline slightly upwards.

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* All the more interesting points connected with the breed and its history have been focussed in the work on "Hereford Cattle" by Macdonald and Sinclair. Vinton & Co., London.

There is a strong presumption that the original breed was "self" or "whole" coloured, being brown or red, shading off into black on the head and points. A breed (small in numbers) of this description has been associated with Montgomeryshire.*

The modern Hereford is also pretty certainly related to the ancient white forest cattle of Wales, from which it originally inherited the tendency to develop and perpetuate the "broken" coloured character exhibited in the white markings. The special form of these markings, according to what seems the best authority on the subject, was given by the introduction from Flanders, by Lord Scudamore (who died in 1671), of a number of white-faced cattle of superior size and quality, and also by a red Yorkshire bull with a white face which was used in the Hereford district soon after 1750. The circumstances which gave rise to these historical records, and also the natural tendency in the original red Hereford to sport back to the white ancestor,—as is even now the case with such decidedly distinct and different breeds as the Scotch polls,—are sufficient to account for the bald head and white underline and extremities of the Hereford.

Benjamin Tomkins (born 1745, died 1815) occupies in the history of the improvement of this breed a corresponding place to that assigned to Bakewell in regard to longhorns, and to the brothers Colling in connection with shorthorns. Tomkins adopted Bakewell's system of inbreeding, and it is recorded that the best of his famous herd sprang from two cows and one bull.

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* A number of these so-called smoke-faced Herefords were till recently in the possession of the Aylesbury Dairy Company, on the farm near Horsham, but were disposed of for beef at the sale in 1888 to make room for the present Sussex herd. They were handsome animals, and in all respects resembled Herefords, with the exception of the colour of their extremities, which were almost black.

The name of Hewer will be for ever associated with the history of the improvement of Hereford cattle. Macdonald and Sinclair say " that the difficulty is to find a single animal of note at the present day that does not inherit Hewer blood." The reference is made to John Hewer, whose active career as a breeder extended over seventy years, from 1803 to 1873. The influence of the Hewer cattle was exerted upon surrounding breeds by the system of letting out bulls, a practice which had then become prevalent among the owners of superior herds of various breeds. In the early history of the breed, the names of Galliers, John Price, Jeffries, Skyrme, T. A. Knight, and Yeomans, also occupy a prominent place.

Herefords as milkers have never been in the first rank. Although an effort is now being made to develop their milking powers, yet as a breed they cannot be classed as dairy cattle, though it is claimed that the milk is of superior quality. The practice of allowing the cows to suckle their calves has prevented the improvement of the breed, by the artificial selection of the best milking cows from which to breed bulls.

The main object for which the breed was kept fifty years ago, was the supply of work oxen for land cultivation. The chief function of the Hereford of the present day, viz., the production of the finest quality of grass-fed beef, was during last century quite a secondary consideration.* In certain parts of Gloucestershire and the surrounding district, bullocks (frequently Herefords) are kept as work animals, and though used mostly in working land are also employed in the cart. Earl Bathurst still employs some thirty selected Herefords in the working of his home farm near Cirencester. When out of work they form a feature of interest in the adjoining park.

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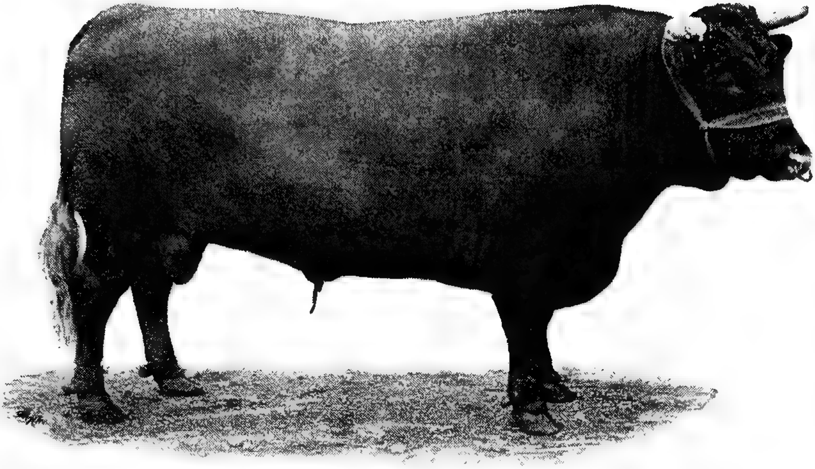
* Hereford bullocks have been largely bought by graziers in the Midland counties of England for at least a century.

THE DEVON BREED

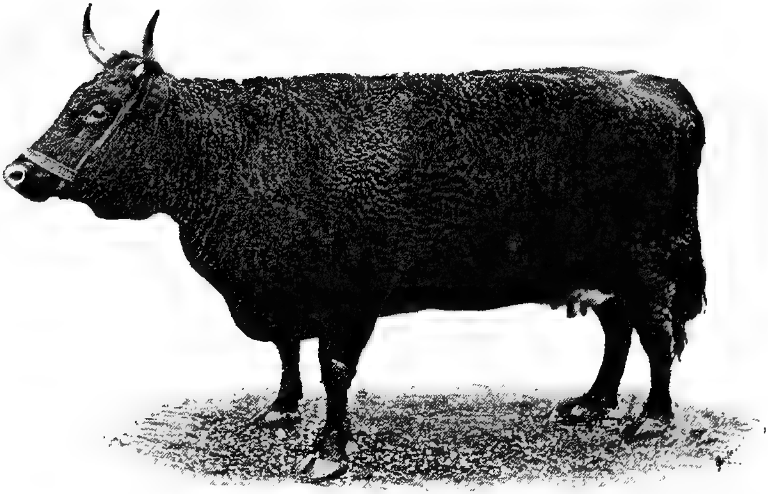
Is primarily divided into—(1) North, and (2) South Devons.

The North Devon is the original true and hardy type belonging to the elevated region in the north of Devonshire. As represented by the best specimens, this division of the breed is unsurpassed for compactness and symmetry of form. It is smaller than the Hereford or the Sussex, two breeds to which it is allied. The colour of hair is a deep blood-red, and of the skin orange-yellow; inside the ears it is orange-red. The yellow is specially noticeable by its appearance round the eyes and muzzle. A small patch of white hair is a common marking on the belly in front of the udder of the cow or the scrotum of the bull. At times it extends till it reaches the forelegs, and by this it may be recognised as corresponding in a limited extent to the white under-line of the distantly related Hereford. The white hairs, sometimes mixed with the natural red brush of the tail, and also in patches on the body, are further proofs of the tendency to develop white markings. The head is adorned, in the case of the female, with particularly elegant, creamy-white, sharp-pointed, black-tipped horns of medium length, having a good elevation at the junction with the head, and curving upwards. In the bull, as compared with the cow, they are shorter in proportion to thickness, straighter, and less raised. The shoulder is specially neat and well formed, the barrel joining on behind, with scarcely a depression at the region of the heart-girth—a defective point in many breeds. The quality of the beef is excellent.

The early history of the breed is lost in obscurity. Francis Quartly and the brothers James and John Quartly, of Molland, North Devon, filled the position in the improvement of this breed which the Collings did in that of the shorthorn. After them may be mentioned John Tanner Davy (the original compiler of the "North Devon Herd



A.—NORTH DEVON BULL, "LORD WOLSELEY," 2063.
First at the Royal Shows at Newcastle in 1887, and Nottingham in 1888.
The Property of the Right Hon. LORD FALMOUTH.



B.—NORTH DEVON COW, "FAIRMAID," 9351 D.D.H.B.
A Royal Winner in 1888.
The Property of Sir W. R. WILLIAMS, Bart., Heanton, Barnstaple, North Devon.

Book"), James Davy, Mogridge of Molland, Merson, Halse, Tapp, and Turner.

The Somerset type of North Devon has in recent years been coming to the front and growing in favour, on account of the larger size, due to the richer and deeper soil and better climate which prevails in that region. With the increase of size of bone there is a tendency to coarseness of figure, and Somerset breeders strive to counteract this by using bulls reared in the north of Devonshire. A parallel example to this is to be seen in numbers of the Ayrshire breed reared away from their home conditions and highly fed. The horns of the Somerset type are more inclined to droop than those of the original North Devon. There is a growing demand for these cattle, not only in America and Australia, but also in our South African colony.

The South Devon, or South Hams division of the breed, differs materially in form from either of the types of North Devon. The members of it are larger, coarser, and not so deeply coloured as the North Devons. They perhaps acquired these differences, to some extent, and also their greater milking powers, by crossing with Channel Islands cattle.

Being originally a mountain breed, the Devon is hardy, strong, and active. It was long famous for supplying useful oxen for farm work, but its employment in this way is now much restricted.

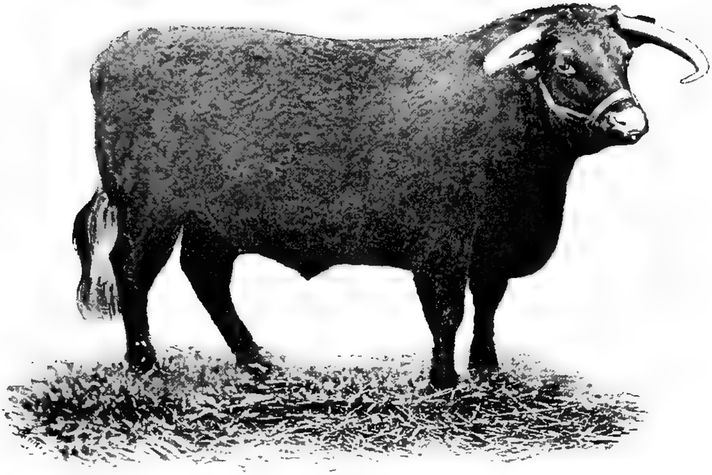
As a breed for milk production, it has been, and still is, inferior. The cows give but a small quantity of rich milk, and tend to go dry early; still many of the dairies in the counties of Somerset and Dorset are filled with Devon cows of the larger type.

THE SUSSEX BREED

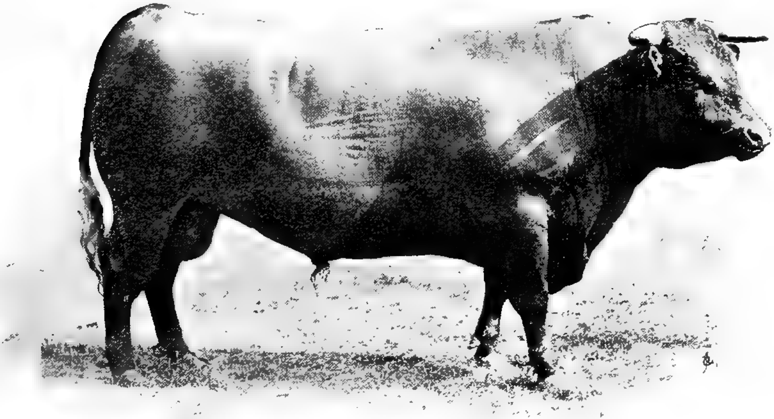
Ranks among the largest classes of British cattle. It belongs to the old race which gave origin more or less directly to the West Highland, the various Welsh breeds, the Hereford, and the Devon. To the latter it bears a very striking resemblance, and no doubt it possesses this in virtue of a collateral descent from the "red cow" that at one time occupied the southern districts of England. The influences of the soil and climate of the weald country has considerably modified the form and character, which, it may be presumed, were at one time similar to the Devon. The horns are longer, stronger, and more irregular in form, with a strong similarity to the style of the horns of the longhorn breed. The colour is dark red, though not, as a rule, of so deep a shade as that of the North Devon. The Sussex is also superior to the Devon in size and strength, but with this it sacrifices something of the neatness which belongs to the latter. The cows are inferior milkers.

The bullocks of the breed, which combined in a marked degree strength and activity, supplied an excellent class of animals suitable for working the heavy land of the weald on which they exist in Sussex and the adjoining counties. It is not at all certain that it was an improvement in practice to discontinue altogether the employment of oxen in favour of horses in working some of the heavier classes of soils. It is quite certain that the land suffers much more from the trampling of horses than from that of work cattle, and in consequence there are some clayland districts where cattle may yet be seen in the plough.

Low aptly explains why representatives of the cattle belonging to the ancient Celtic inhabitants of these islands were preserved in certain parts. Wherever the region was difficult of access to the invaders, as in the case of mountainous tracts or large areas of forest, there the original inhabitants found shelter and safety for themselves and their cattle. Thus in the hilly localities we have preserved the Scottish West Highland, the Welsh, and the Devon; and in the instance before us, the dense forests of the weald



A.—SUSSEX OX, GRANDSIRE, W. S. FORSTER'S FAMOUS BULL, "GOLDSMITH,," 391.
Won the Breed Cup at Islington in 1886.
The Property of W. S. FORSTER, Gore Court, Maidstone.



B.—SUSSEX BULL "GONDOLIER," 1001.
First Prize, Royal Agricultural Society's Show, Warwick, 1892.
The Property of W. S. FORSTER, Gore Court, Maidstone.

afforded the necessary security for the ancestors of the Sussex breed.

The cattle of the accessible parts of the interior of the country were either supplanted altogether, or much altered in form and character by imported blood.

In India exactly the same condition of things exists, where the small, dark-haired, and inferior breeds have been driven away into remote and out-of-the-way corners; and the more valuable tracts of country, the highways of conquering armies, and more recently of trade and commerce, have been supplied, probably repeatedly, by importations of the larger and finer white-haired varieties. The parallel is not quite complete, as in some of the breeds in this country emerging from obscurity (and notably among these is to be found the Sussex) are animals of great size and substance and wealth of constitution.

CHAPTER V.—BREEDS OF DOMESTIC CATTLE—THE WEST HIGHLAND, WELSH, AND SHETLAND.

The West Highland—Habitat and Descent—The Bullocks—Points of Form and Colour—The Wild Nature—Crosses—Importance of a Hardy Constitution—Welsh Cattle—Varieties—The South Wales or Pembroke—Points—Feeding and Quality—As Milkers—North Wales or Anglesey—Compared with Castle Martin—Cows as Milkers—The Bullocks—Herd Books—Suitability of Welsh Cattle for America—Ancient White Breed—The Glamorgan Breed—The Old Gloucester Breed—Orkney and Shetland Cattle—Peculiar Case of Atavism.

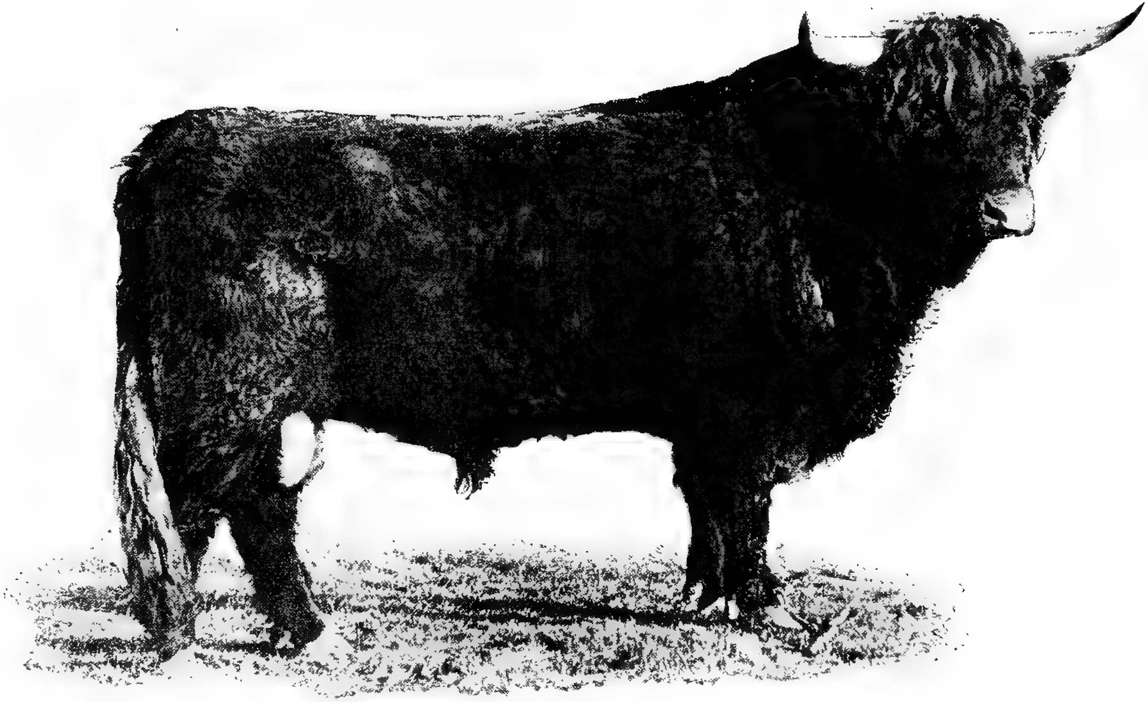
THE WEST HIGHLAND BREED,

OR, **to be more accurate, the South-West Highland** breed, belongs to the Western Islands of Scotland, to Argyleshire, and the adjoining counties.

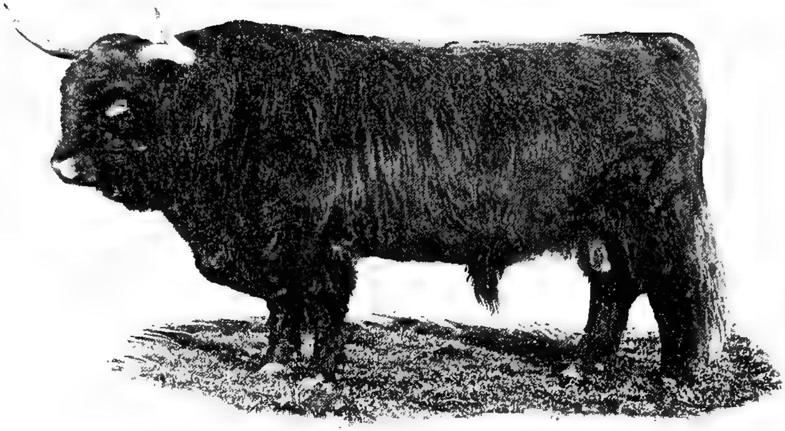
It is the remaining selected representative of the different varieties of Scottish mountain cattle, the semi-domesticated descendants of the ancient breed of the forests. At one time, before the land was stocked with sheep, it occupied the wild pastures of the true Scottish Highlands. The mild or "open" character of the climate of the extreme west, along with the careful selection in breeding followed by the Dukes of Argyle, all tended to foster that superiority of quality which has enabled it to successfully supplant the inferior sorts inhabiting the inland uplands. This is the hardiest of all British breeds, and from an artistic point of view the most picturesque.

The bullocks are, when three or four years old, highly and justly appreciated as park cattle in all parts of the

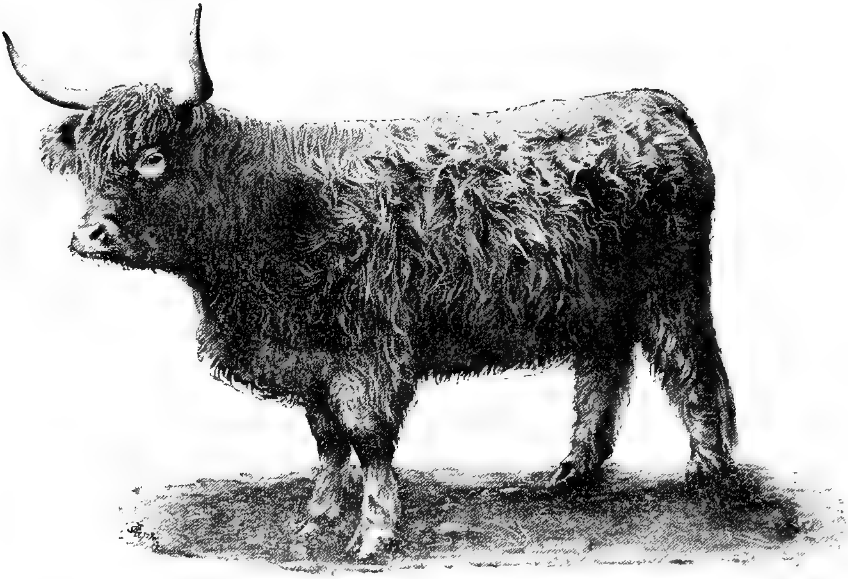
PLATE XIII.



WEST HIGHLAND BULL, "SEUMAS A GHLINNE," 482.
The Property of the Right Hon. THE EARL OF SOUTHESK, K.T.



A—WEST HIGHLAND BULL, "CALUM RIABHACH."
Champion at the Highland Centenary Show in 1884, and other Prizes.
Bred by His Grace THE DUKE OF ATHOLE, K.T., the Property of the Right Hon. LORD KINNAIRD.



B.—WEST HIGHLAND HEIFER, "LADY FLORA."
The Property of the Right Hon. THE EARL OF SOUTHESK, K.T.

kingdom, where their long and elegant black-tipped horns, the variety of colour of hair, and the long and silky, shaggy, and uncommon appearance of their coats, render them objects of universal interest and admiration. As beef-producers they are, while young, slow in coming to maturity, but the ultimate product is unsurpassed in quality in the leading markets of the kingdom.

Points.—The body is massive, well-formed, well-fleshed, and supported on low and powerful limbs. From the under part of the neck is suspended a dewlap, and on the top of it is a hairy fringe or mane. The colour varies from black to a creamy-yellow or white, through all shades of dun, red, brown, and at times brindles. Black has been thought to indicate hardiness, though some of the lighter-coloured animals with the tendency to an orange tint of skin feed better under forcing or artificial treatment.

The calves are allowed to follow their mothers, and are not handled or subjected to close contact with man. They consequently develop wild instincts and practices. The cows do not excel as producers of large quantities of milk, although the quality of it is good. When they are milked by hand the flow of milk does not continue late in the season.

West Highland cows cross admirably with bulls of most British breeds. Full advantage can thus be had of the good qualities of the breed, even under the system of early maturity, without necessitating the sacrifice of the native hardiness of constitution, so invaluable in a mountainous country, in the endeavour to induce early maturity in the pure breed. Unless the constitution is maintained, advantage cannot be taken in an upland country of the supply of natural food, which costs little, and cannot be utilised except as food for such animals. The cost of producing a four-year old Highland bullock on his natural food, is very much less than the cost of producing a stall-fed animal of the same weight at two years old, because the food of the latter is costly to grow and costly to buy.

To substitute the early maturity animal, either by importation or by modifying the existing breed by in-and-in-breeding, for the real West Highland ox in his home quarters, would lead to a loss of profit to the farmer, and the loss to the community of the natural cattle-food of the district.

WELSH CATTLE,

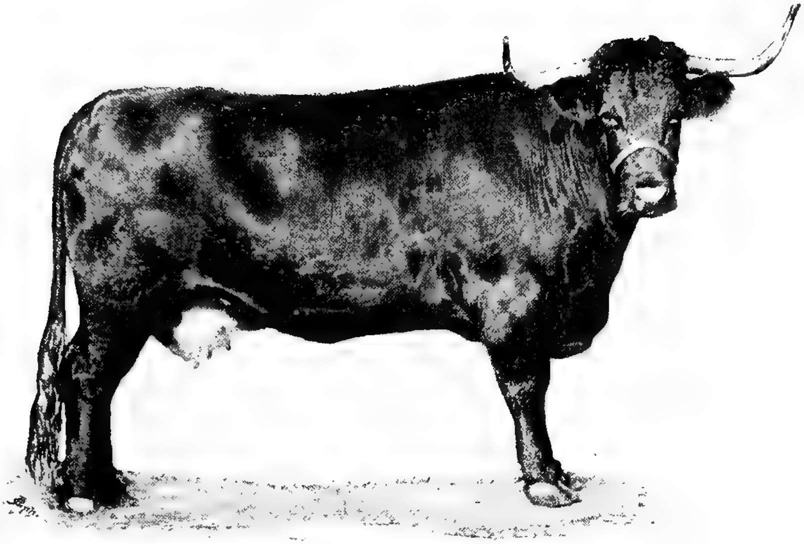
Although usually spoken of as consisting of a number of distinct breeds, are yet closely allied to each other, and interbred without the results of cross-breeding appearing. The two best known breeds, each with a Herd Book of its own, are—(1) the South Wales, Pembroke, or Castle Martin black breed, in which at times white specimens with black points are born, resembling in many respects the extinct forest breed of Wales described by Low; and (2) the North Wales or Anglesey black breed. In addition to these, there is (3) the Glamorgan breed.

The South Wales black breed is sometimes subdivided into—(*a*) Castle Martin, and (*b*) Dewsland breeds.

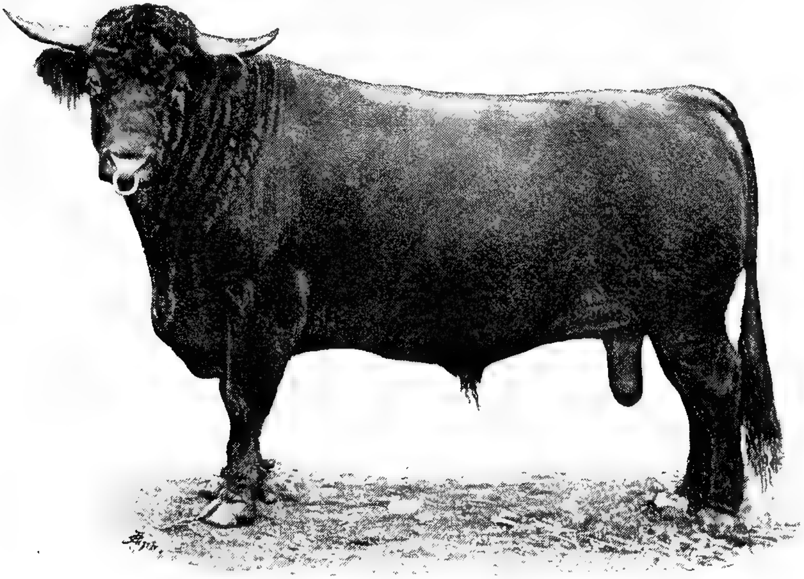
Points.—Although the prevailing colour is black, white markings on the belly, or white hairs in the brush of the tail or other parts of the body, now and then appear. A russet, chocolate, or brown-black colour is considered good.

The horns are long, yellow, and black-tipped. As in many instances already noticed, the horns of the male are not only lower set, but they are stronger and shorter than in the female. In their long though straight coats of hair, and their hardiness of constitution, South Wales cattle strongly resemble West Highlanders. As ought naturally to follow under the circumstances, they have no great aptitude to fatten at an early age. When allowed to come to

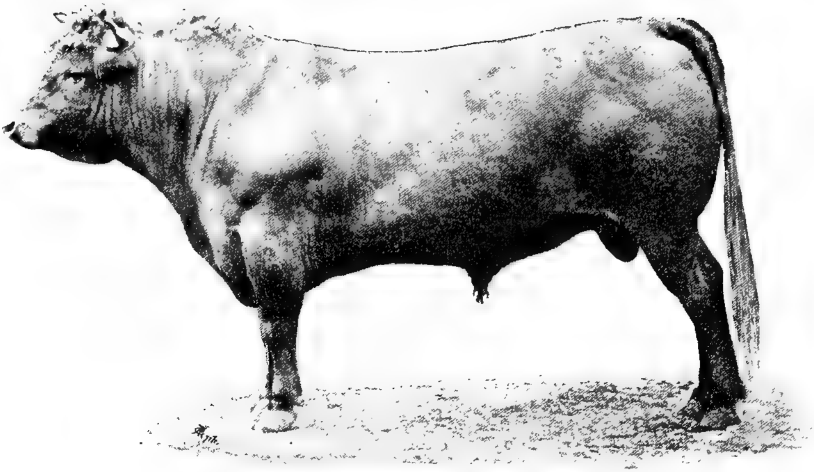
PLATE XV.



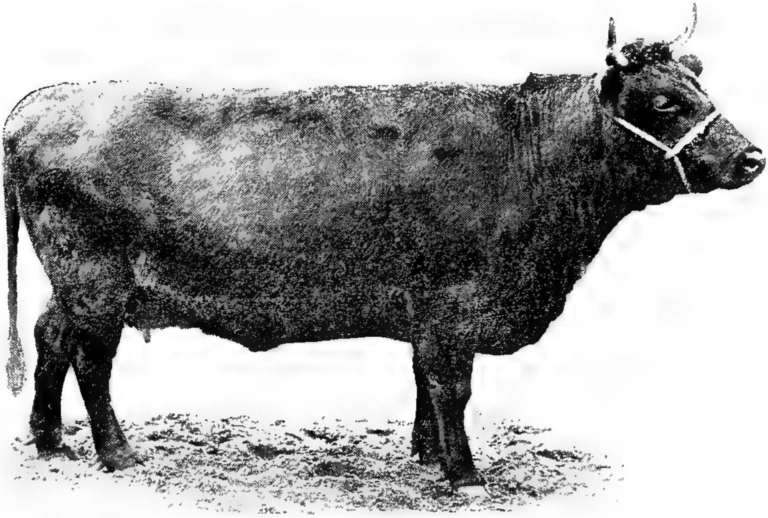
A.—BLACK SOUTH WALES COW, "LENORA I.," 245.
At one time in the Herd of the Right Hon. THE EARL OF CAWDOR, Stackpole Court, Pembroke, South Wales.



B.—BLACK SOUTH WALES BULL, "ZULU," No. 129.
At one time in the Herd of the Right Hon. THE EARL OF CAWDOR, Stackpole Court, Pembroke, South Wales.



A.—NORTH WALES BULL, "TOM."
The Property of Captain J. C. BEST, Vivod, Llangollen.



B.—BLACK NORTH WALES COW.
The Property of Colonel PLATT, Llanfairfechan, North Wales.

maturity they finish admirably, both as regards internal fat and external condition.

As milkers they are superior dairy cattle. This quality, in common with the instinctive practice of hiding their young, they possess by descent from the white forest cattle of Wales. Calves are, as a rule, only left with their mothers for a few days, or in special cases two or three weeks, when they are weaned and reared on skim milk, with some additional food to raise the standard of feeding.

The North Wales or Anglesey black cattle resemble in many respects the South Wales breed. From Anglesey they extend southward along the coast till they meet and mingle with the South Wales breed. From the latter they differ in being smaller, and in having shorter legs, heavier heads, thicker necks (denoting good constitution); thicker, shorter, and whiter horns; finer and more silky coats of wavy hair (neither curly nor bristly), thinner skins, and a better touch. The colour most highly appreciated is black, though there is a greater tendency to white markings. They are not naturally so wild as South Wales cattle, but more resemble the shorthorn in disposition.

The cows are good milkers, but probably not quite equal to the Pembrokes. As beef producers they are the better of the two, having broader backs and better flanks and thighs. There is a tendency in the breed to be high at the rump and tail-head and slack at the loins, but these defects are being eliminated by selection.

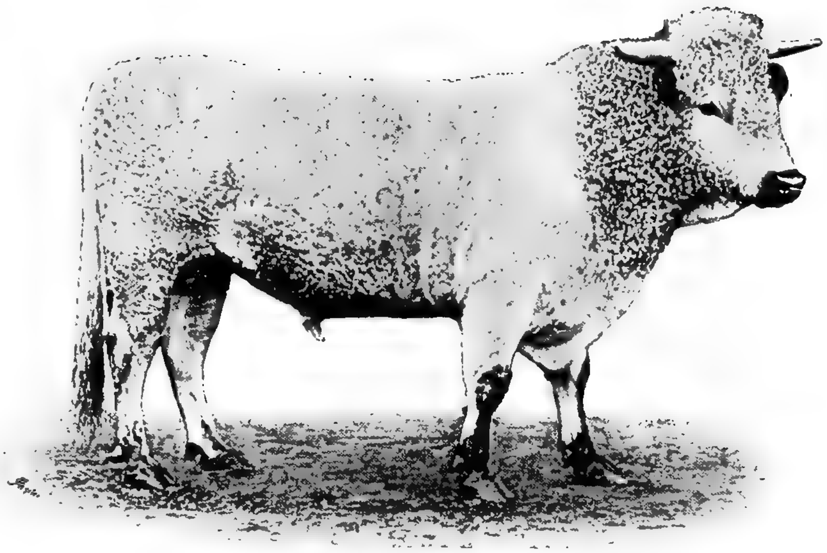
The bullocks have been long and highly appreciated as grazing cattle in the English Midlands under the name of "Welsh Runts." They weigh at four years old 50 to 60 stones of dressed beef, which ranks in the London market with the best Scotch. Heifers have also been sent in considerable numbers to graze in Kent, Leicester, and Northampton. Each of the breeds has a **Herd Book,** and the cattle are improving rapidly under the greater care devoted to their selection. They have begun to be appreciated in America, and, on account of their wealth of constitution will no doubt grow in favour. American ranchers have been taught a severe lesson by the death of immense numbers of their cattle, and have been shown the absurdity of breeding stock too fine and too soft on the exposed prairies of the Far West. Had they been fortunate enough to select Welsh or Highland cattle, and been contented to manufacture beef at a slower but surer rate, they might have saved themselves the serious consequences of disaster.

The ancient white breed of the Principality is now being rehabilitated, by selecting and mating together those specimens of the South Wales breed which have "thrown back" in the matter of colour to their forest ancestors. In every other respect they are distinctly Pembroke cattle. Their colour is chiefly white, but there are frequently black spots over the body. The muzzles, ears, and eyelashes are black, and the feet and fetlocks should also be black, though this detail is not yet quite fixed. Charles Mathias, of Lamphey Court, to whom the bull shown in the accompanying plate belongs, is endeavouring to raise this off-shoot of the South Wales breed to a position of importance.

The Glamorgan breed has narrowly escaped extinction by the encroachments of the early maturity shorthorns, Devons, and Herefords. It is one of the most ancient in the country, and is supposed to have been formed from the old Welsh breed by crossing with imported Normandy cattle. The cows are good milkers, but the fattening properties of the breed are defective. In colour the bulls are black, with a white belly and a line or ridge of white along the full length of the back. The cows are similarly marked with white, but on the body they vary from black to a deep brown or red. The tail-head is liable to be too high, like that of the other Welsh breeds.

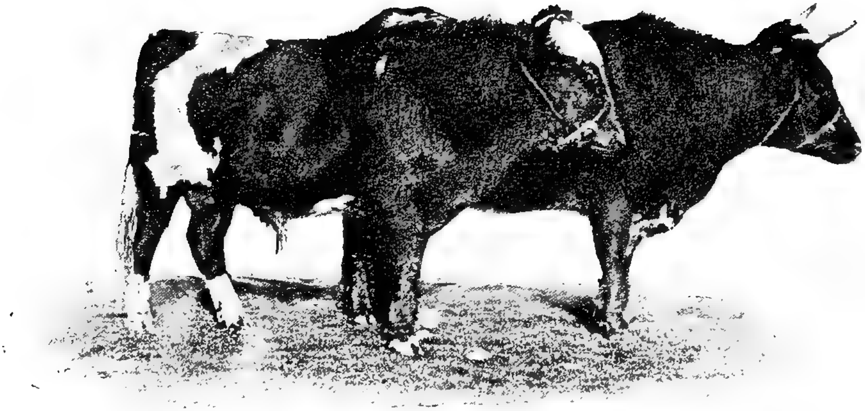
The members of the only remaining herd of the Old

PLATE XVII.

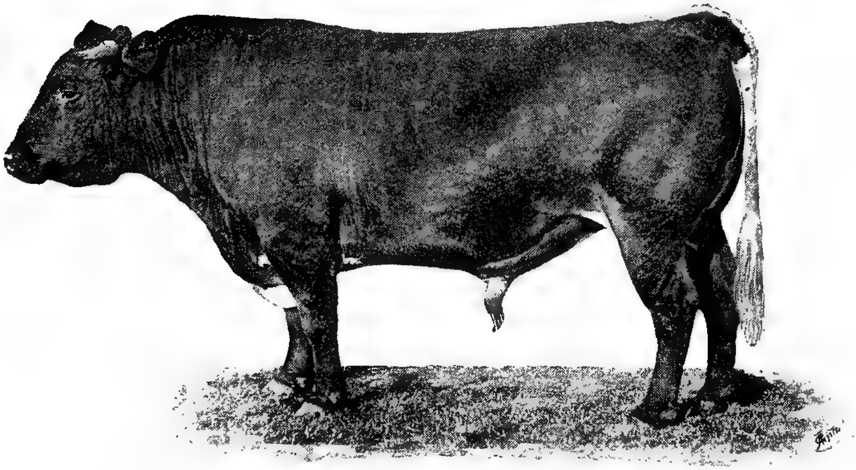


WHITE BULL CASTLEMARTIN BREED.
The Property of CHARLES MATHIAS, Lamphey Court, South Wales.

PLATE XVIII.



A.—SHETLAND CATTLE.
The Property of the Most Hon. THE MARQUIS OF LONDONDERRY, K.G.



B.—GLAMORGAN BULL.
The Property of J. T. DAVIES, Tyla Gwyn, Pontlanfraith, Mon.

Gloucester breed of cattle, belonging to the Duke of Beaufort at Badminton, are identical in their special points with those of the Glamorgan breed. This fact leaves no reasonable doubt but that the two breeds had a common ancestry.

ORKNEY AND SHETLAND CATTLE,

According to Low, **belong to the Norwegian race,** and are different from the race found on the Scottish mainland, though identical with that of Iceland. More recent authorities do not indorse this opinion.

A distinction is drawn between the cattle on the two groups of islands, although it is well known that crossing has gone on between the two varieties.

These island cattle are small, and, as a rule, irregular in their appearance and points, though the best of them may be called handsome. They lay on flesh readily, and produce excellent beef. They are also good milkers. The colours of hair are extremely various—usually broken, and of a light shade. The horns are short, irregular in form, and insignificant.

These cattle are hardy, and able to withstand the cold and trying weather they have during generations been accustomed to. They cross well with good bulls of other breeds, but the attempt to improve the breed by importing alien blood has not proved a success.

The facts relating to the following interesting cases of atavism in connection with cattle descended from this breed have been supplied by Professor Blackburn:—"About thirty years ago Mrs Blackburn got, at Roshven, Moidart, N.B., a pure Brittany bull and cow, but after some years there was a difficulty in securing a pure Brittany bull to keep up the stock, and a young bull—a cross between a Brittany and a Shetland—was bought. A very considerable proportion of the progeny of this bull by the pure Brittany cows were pure white, with black ears and points like the wild white cattle—not albinos." As white with black points is a combination of colour unknown in either of the pure breeds from which the cattle sprang, its repeated appearances can only be explained as instances of reversion. *See illustration,* p. 25.

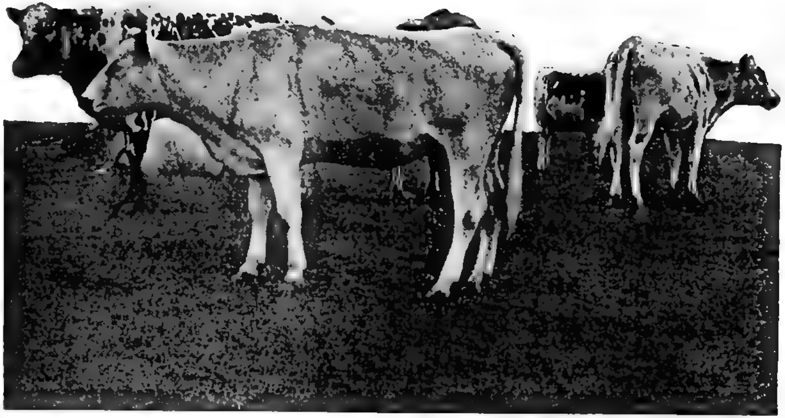
CHAPTER VI.—POLLED BREEDS.

Somerford Park White Herd—Milking Powers—The "Missing Link"—Blickling Hall and Woodbastwick White Polled Herds—Red Polls—How Descended—Points—Improvement—Low on the Breed—A Herd Book—The Aberdeen-Angus Breed—Home Locality—Relationship to other Scotch Breeds—Absence of Horns—Black and other Colours—Buchan Cattle—Breed of the present Day—In-and-in-Breeding—Hugh Watson—William M'Combie—Recent Performances of the Breed—Characteristic Features—Compared with the Galloway—The Polled Herd Book—The Galloway Breed—Distinctive Characters—The Head—Origin of Polled Condition doubtful—Connection between the Galloway and the West Highland Breeds—Additional Proof of the Influence of the Galloway in Crossing—Galloways as Dairy Cattle—The Establishment of a Galloway Herd Book—Galloway Crosses with other Breeds.

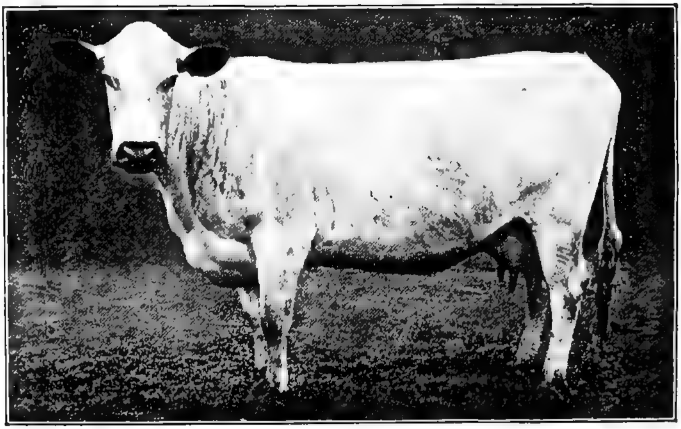
WHITE POLLS.

THE **Somerford Park White Herd,** located in Cheshire, and numbering about 35, contains the chief representatives now extant of the domesticated, hornless, direct descendants of the ancient forest cattle of this country. In general appearance (including colour) they strongly resemble the Chartley cattle, the great difference being the want of horns. In some minor details the resemblance is striking,—for example, both breeds have the top-knot of long white hair, the white tail, the udder with usually black teats, and black spots, most numerous about the neck and head. **The milking powers** of certain members of the breed are exceptionally good. The herd averages daily over three gallons of milk each when in full flow at pasture, but individual cows appear now and then which give, when "in bloom," as much as fourteen quarts at a milking, or seven gallons in the day. The best specimen of the present time yields six gallons daily when she is in full profit.

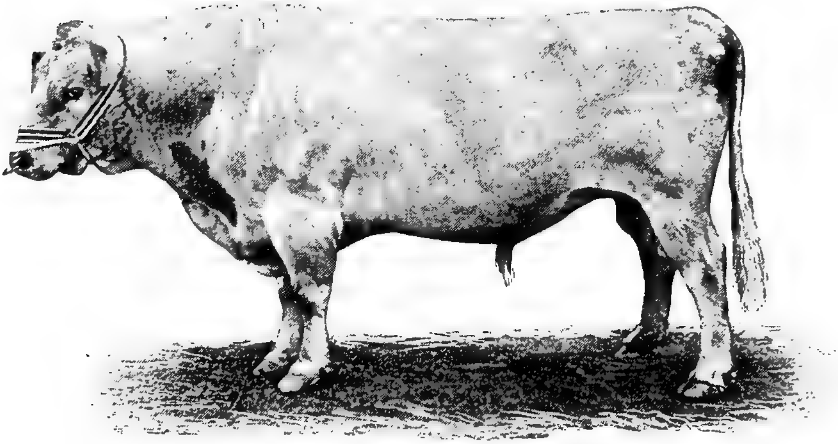
PLATE XIX



Somerford Park White Polled Cattle.
The Property of Sir C. W. Shakerley, Bart., C.B., Somerford Park, near Congleton, Cheshire.



A.—NORFOLK WHITE POLLED COW, "BLICKLING JENNY."



B.—NORFOLK WHITE POLLED PRIZE BULL, "TOM."
The Property of the Most Hon. CONSTANCE, MARCHIONESS DOWAGER OF LOTHIAN,
Blickling Hall, Aylsham.

When not giving milk the cows are not deficient as beef-producers. The breed, approaching in size to the shorthorn, is well fleshed and massive, with the exception of the hind-quarters, which are rather light in proportion to the fore-quarters and trunk. They possess this defect in common with our wild cattle and with the cattle of India; but the whole style of the animals is striking and attractive, the head being specially handsome. The rudimentary mane present in the bull when in full coat is not only an ornament, but also an additional indication of the connection of the breed with the ancient "wild beasts" of the forest. This is one of the most interesting breeds of British cattle, as it forms (with the remnants of the Norfolk polled whites) the "missing link" between the wild cattle and the breeds under domestication, and supplies a connection between the horned and polled varieties. It also tends to prove the existence of a superior power of milk production in the aboriginal race of our island, or at all events in the domesticated branch of it.

The Blickling Hall Herd and the **Woodbastwick Herd,** both in Norfolk, are what remain of an old Lancashire breed of domesticated white cattle with black or brown ears, which were first taken to Gunton Park. They have been crossed with shorthorns and red polls, which has changed their external form; nevertheless they are said to have visibly degenerated in size, though they are yet animals of good dimensions. In milking qualities and in their powers of breeding they are not defective.

THE RED POLLS,

Or the Norfolk and Suffolk breed, are descended within comparatively recent times from the original horned Norfolk breed and the dun or mouse-coloured polled cattle of Suffolk. The latter, though coarse and ill-formed in appearance, was noted for very superior milking power, which is maintained in the new breed, though not in the perfection that ancient records would have us believe belonged to the old. By going still further back, we find that polled bulls were introduced into the district referred to for breeding purposes from the original white breed of the country, and also from the Galloway breed, the latter being brought south with the annual droves of grazing bullocks from Scotland. About the beginning of this century the deep blood-red specimens were collected by some, and owing to fashion changing in favour of red, and to its being intensified and perpetuated by close-breeding and selection, it has steadily supplanted the original colour of the breed.

Points.—The head is small, neat, and well and "cleanly" joined to the neck. In general appearance and refinement of parts the breed strongly resembles the Polled Angus and the North Devon.

Improvement.—The rate at which the red poll has come to the front and has taken its place among the most important breeds in this country is quite remarkable.

Low, writing in 1845, after giving the breed under the name of Polled Suffolks a poor character in respect of almost every quality except that of milk production, suggested the great probability of its immediate extinction. Recent years have seen not only improvement in quality, but a large extension of the numbers of good herds and of first-rate animals.

The existence of a well-conducted **Herd Book** will stimulate interest in, and firmly establish, the best strains of blood which ought to be devoted to milk production as well as to the laying on of flesh.

BLACK POLLS.

The Aberdeen-Angus Breed, from Aberdeenshire,*

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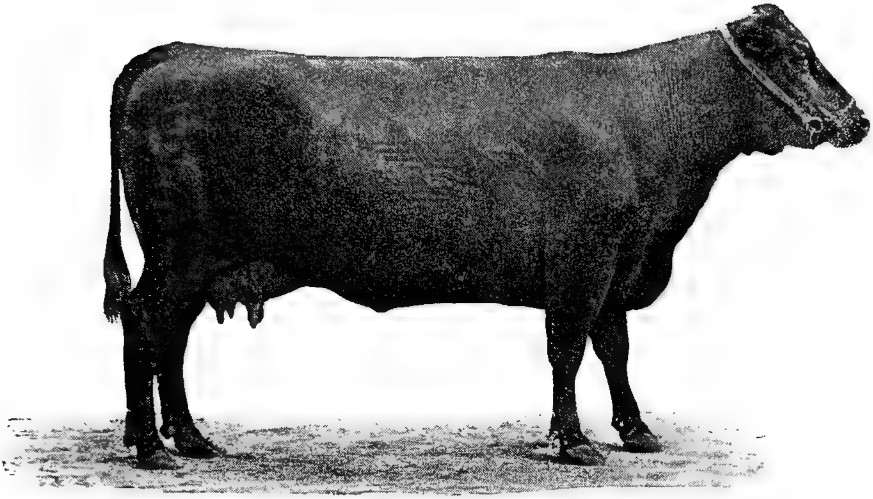
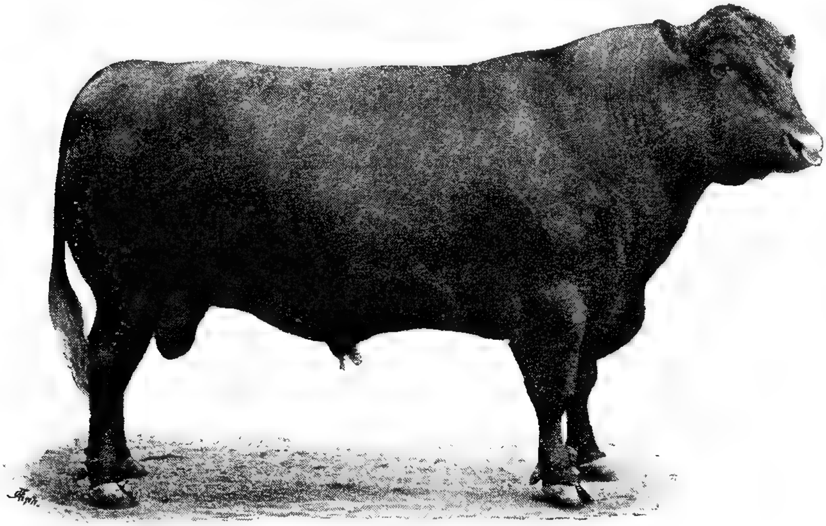
* We are indebted for much historical matter to the exhaustive work on Polled Cattle by Macdonald and Sinclair, Blackwood & Sons, Edinburgh.

PLATE XXI.



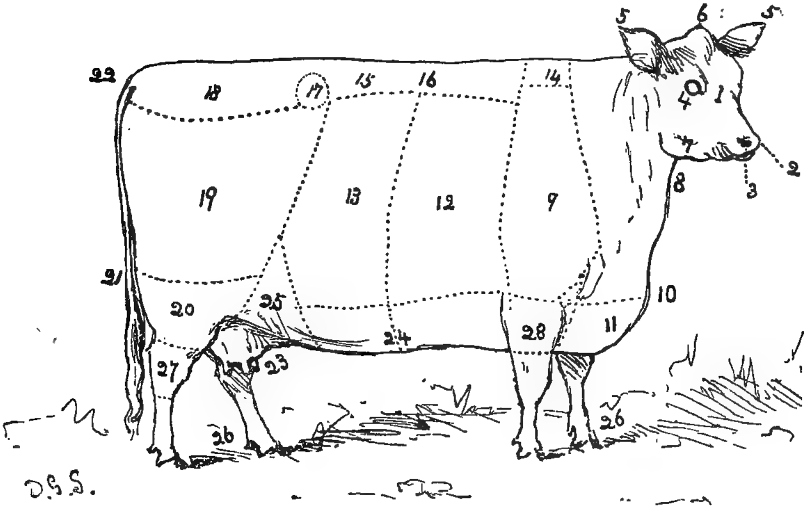
A.—NORFOLK AND SUFFOLK RED POLL COW, "EMBLEM," L. 3,2782.
The Property of LORD AMHERST, Didlington Hall, Brandon, Norfolk.



B.—NORFOLK AND SUFFOLK RED POLL BULL, "DIDLINGTON DAVYSON II.," 657.
The Property of LORD AMHERST, Didlington Hall, Brandon, Norfolk.

Forfarshire, and the district largely embraced within the adjoining counties, is most probably the result of the amalgamation of a number of very different, local, polled and also horned breeds, associated with careful selection and in-and-in-breeding, together with, it is asserted, the infusion, within comparatively recent times, of a greater or less degree of alien blood. In common with the only

Typical ideal Specimen of Aberdeen-Angus (*from the Herd Book, 1889*).



Index of Points.

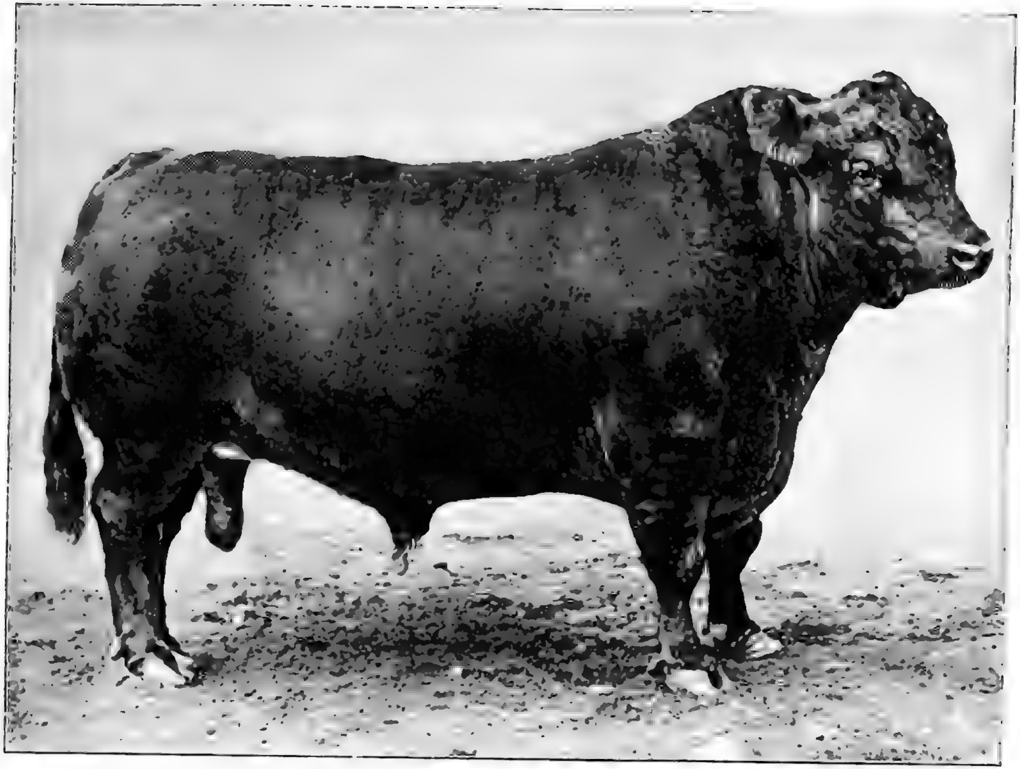
1. Forehead and Face.
2. Muzzle.
3. Nostril.
4. Eye.
5. Ears.
6. Poll.
7. Jaws.
8. Throat.
9. Shoulder.
10. Chest.
11. Bosom (or Brisket).
12. Fore Ribs.
13. Back Ribs.
14. Crops.
15. Loins.
16. Back.
17. Hooks.
18. Rumps.
19. Hindquarters.
20. Thigh.
21. Twist.
22. Tail and Setting on.
23. Udder.
24. Under-line.
25. Flank.
26. Legs and Bone.
27. Hough.
28. Forearm.

other domesticated breeds of the Scottish mainland, the Galloway, the West Highland, and the Ayrshire, there is a strong probability, if there is not absolute proof, that it originally descended from the native wild cattle of the country. The difference of climate and surroundings, together with the influence of artificial selection by man, and probably the importation of fresh blood from abroad, are sufficient to account for the difference of existing appearances in all those allied varieties.

The absence of horns, and the prevailing almost uniformly **black colour,** although ranking among the most persistent characteristics of the Northern Scotch polls, were by no means uniform features in olden times. Black animals without horns did exist a hundred years ago and more, but long after the beginning of this century very many of the cattle from which the existing breed sprang had horns. Their colours were extremely variable; some were yellow, red, or brown; others brindled (red and black, sometimes with white mixed or broken in an irregular flaked fashion), black and white, " belted " and " rigged "—the latter black with a white or brown stripe along the back. Certain herds had a brown ring round the muzzle associated with the brown ridge. According to the early records, the largest and best varieties of the polled cattle were to be found in the low country. The smaller horned cattle which resembled the old Highland breeds occupied the uplands.

Buchan cattle, about half of which were polled at the end of last century, justly claimed superiority. They did so as far back as the time of the Romans. They have been represented from time immemorial by two polled breeds possessing good milking powers, but of very different size. These were locally termed " humlies," while the early Polled Angus variety were named " doddies." In the " General View of the Agriculture of Angus," published in 1813, it is

PLATE XXII.



CHAMPION ABERDEEN ANGUS BULL, "CASH.

The Property of LORD TWEEDMOUTH

stated, with regard to the general stock, that "little attention was then paid to the selection of the males or females by whom the breed was propagated." The good qualities of the cattle of the present day, we may therefore conclude, have been either developed in recent years, or have been obtained by selection and moulding from the superior herds of those proprietors who, before the time referred to, took an interest in the improvement of live stock.

The Aberdeen-Angus of the present day occupies among Scotch cattle very much the same position that the Devon does among English breeds for quality of flesh, refinement of type, perfection of symmetry, and, it might be added, for the excellent flavour of its marbled beef; yet it must not be forgotten that these qualities, like those of all British breeds, however distinct and however permanent they may be, are the results of the commingling of blood of various kinds. No single breed is pure if we go back for but a few generations.

It is recorded that less than one hundred years ago crossing was carried on with Ayrshire, Guernsey, Fife,* shorthorn, and Galloway cattle. How much of this blood has been maintained in the best animals of the present day is a matter for conjecture. It is true that the well-known attempt by Lord Panmure to introduce a Galloway cross was not attended with success; but, on the other hand, there is good reason to believe that the very extensive and successful use of shorthorn bulls in breeding grazing cattle for the southern markets, led to the incorporation of shorthorn qualities into the breed during the early years of its improvement.

At times very distinct shorthorn characters appear by atavism in polled cattle of good blood and long pedigrees, and disappear in the next generation.* The use of a shorthorn bull on virgin polled heifers has also been accredited with the power of stamping shorthorn qualities upon their future calves by bulls of their own breed.

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* The Fife horned breed is now extinct. They were large black cattle, rather slow at coming to maturity at an early age, but unsurpassed as grazers after they were three years old.

In-and-in-breeding has been adopted to fix the good qualities which have from time to time been spontaneously produced by nature under the influences of the tendency to change brought about by crossing. In the matter of consanguineous relationships, the Aberdeen-Angus is not an exception to the rule which applies to the shorthorn and other well-known breeds.

Hugh Watson, of Keillor, in Forfarshire (born 1789, died 1865), was the Colling of the northern polled breeds, carrying out the principles laid down by Bakewell and his followers.

It was reserved for **William M'Combie,** of Tillyfour (born 1805, died 1880), to make the breed known to the outside world. After a long and successful showyard career, he eclipsed all the previous performances of the breed by carrying off two champion prizes of £100 each at the Paris International Exhibition in 1878—(1) For the best group of foreign cattle; and (2) For the best group of beef-producing animals—both bred by the exhibitor.

During recent years no breed has been so successful as the Polled Aberdeen-Angus in competing for the highest honours at the London and Birmingham Christmas fat shows, and at similar "expositions" in America.

In this country the names of Clement Stephenson, Newcastle; George Wilken, Waterside of Forbes; and Robert Walker, Altyre (agent to Sir W. G. Gordon Cumming,

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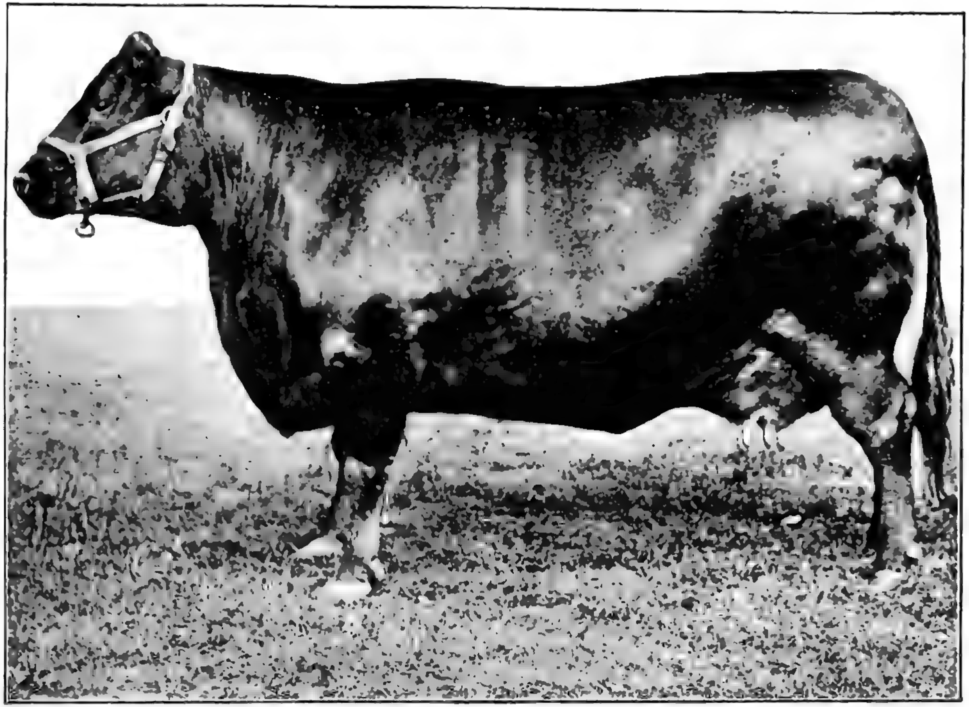
* The Author remembers having seen a black and white cow of this kind some years ago, which had well-developed horns, and quarters unmistakably like those of a shorthorn. Her immediate ancestors as well as her descendants were animals of the pure type, and of superior quality.

PLATE XXIII.



CHAMPION ABERDEEN ANGUS COW, "WATERSIDE MATILDA II.," 6312.
Four times First at Highland Society's Shows, and Winner of the M'Combie Cup in 1886 and 1888.
Was the Property of GEO. WILKEN, Waterside of Forbes, Aberdeenshire.

Bart., of Altyre)—are closely associated with these honours.*

As a breeding herd of old standing, that of Sir George Macpherson Grant at Ballindalloch occupies the premier position in Scotland.

Standard of Excellence for Aberdeen-Angus Bull.

From the Herd Book.

"*Registered Pedigree.*

Colour.—Black. White is objectionable, except on the under-line behind the navel, and there only to moderate extent; a white cod is most undesirable.

Head.—Forehead broad; face slightly prominent, and tapering towards the nose; muzzle fine; nostrils wide and open; distance from eye to nostril of moderate length; eye mild, full, and expressive; ear of good medium size, well set, and well covered with hair; poll well defined, and without any appearance of horns or scurs; jaws clean.

Throat.—Clean, without any development of loose flesh underneath.

Neck.—Of medium length, muscular, with moderate crest (which increases with age); spreading out to meet the shoulders, with full neck vein.

Shoulders.—Well laid in, covered on the blades and on the top, which should be on a line with the back, and moderately broad.

Chest.—Wide and deep.

Bosom (*or Brisket*).—Standing well out between the legs, and moderately covered with flesh and fat.

Ribs.—Well sprung from the back bone, arched and deep, neatly joined to the crops and loins.

Back.—Broad and straight from crops to hooks; loins strong; hook bones moderate in width, not prominent, and well covered; rumps long, full, level, and rounded neatly into hindquarters.

Hindquarters.—Deep and full; thighs thick and muscular, and in proportion with hindquarters; twist full.

Tail.—Fine, coming neatly out of the body on a line with the back, and hanging at right angles to it.

Under-line.—As nearly as possible straight; flank full and soft.

Legs.—Short, straight, and squarely placed; hind legs slightly inclined forward below the hocks; forearm muscular; bones fine and clean.

Flesh.—Even, without bumps or patchiness.

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* Full details of the wonderful showyard performances of this breed on both sides of the Atlantic up to 1886 may be seen in Auld's work, "The Breed that Beats the Record," by Aldine Co., Detroit.

Skin.—Of moderate thickness and mellow touch, abundantly covered with thick and soft hair.

General Appearance.—Gay, well-bred, and masculine."

[With the exception of those relating to sex, the points of the female are identical with the above.]

Only a few characteristic features call for special mention. The normal colour is black, but the rusty brown referred to in varieties of the old breeds, and also white patches of moderate dimensions about the udder and belly, are tolerated. Though to appearance an animal of this breed looks small, yet owing to its short legs and compact rounded form its weight classes it among the larger breeds. The hook bones are not so wide or prominent, and the quarters not so square as in the shorthorn. The absence of patchiness and the equality and levelness of flesh are proverbial. The milking qualities are low as regards quantity, the result of breeding for beef and the prevailing custom of suckling the calves.

As compared with the Galloway, the breed weighs heavier at an early age owing to its greater rapidity in coming to maturity, though a difference in the size of breeding stock is not marked. The bones are finer, the skin thinner, the hair shorter and more silky, and the poll more pointed than in the Galloway.

The first volume of the "Polled Herd Book" was published in 1862, and the second in 1872. After the publication of the fourth volume the Galloway portion was withdrawn, to be published separately; while the Polled Cattle Society, which was established in 1879, has since its formation superintended the registration of the Aberdeen-Angus breed.

THE GALLOWAY BREED

Derives its name from a district in the south of Scotland, comprising Wigtonshire and the Stewartry of Kirkcudbright. At one time it was the most prevalent breed in Scotland south of the Forth and Clyde.

Distinctive Characteristics.—Though Galloways are now polled and of a black colour, with a brown tinge on the tips of the hair, particularly at that stage when it is long and inclined to be curly or woolly, yet within the last hundred years many animals of pure blood had horns of considerable length, and not a few were red-brown in colour. These characters even now appear in specimens bred from the best strains. White patches on the udder and belly, and also belted markings, are common, and are not seriously objected to unless they are large or prominent.

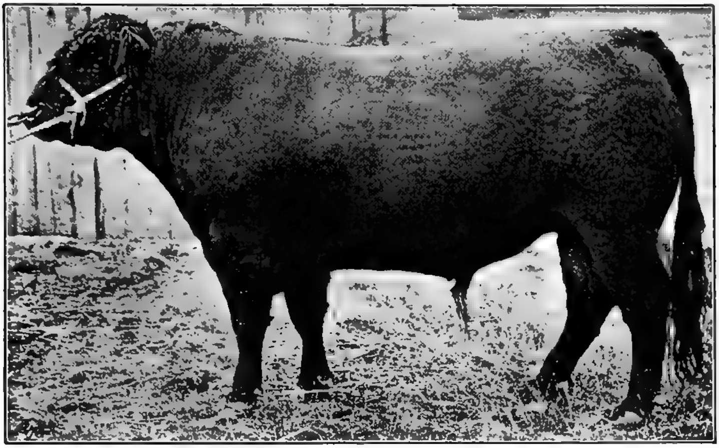
This tendency to revert to white on the under-line, which is most pronounced when two animals of very distinct types are mated together, indicates the descent from the ancient wild cattle, a condition similar to that already pointed out in the case of other breeds.

The head of a Galloway should be wide and short—a long head is one of the prominent characters by which a black Galloway cross can be distinguished from a pure bred animal; the distance from the eye to the nostril short; the forehead broad and square between the eyes, carrying the width well up to the crown, which should be low and rounded, not peaked like the crown of the Polled Angus. The ear, resting on a short shank, is set on rather farther back than in most breeds, and should point upward and forward. The lobe or flap should be wide, rounded at the top, and abundantly fringed with hair.

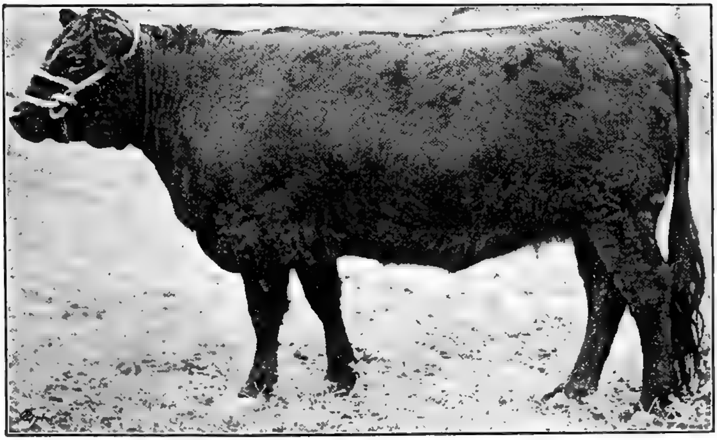
The origin of the polled condition is veiled in doubt. It may be said that the early written history does not even speculate upon its cause. It is known that this characteristic was preferred by the English buyers who, since a time soon after the union of the crowns of England and Scotland in 1603, have carried bullocks of the Galloway breed to graze in the southern counties, especially Norfolk and Suffolk. The injury which half-wild cattle with horns were capable of inflicting upon one another, and possibly upon the men in charge of them, during a walk of some hundreds of miles, seems to be a sufficient excuse for the preference of the southern drovers for the condition of hornlessness, which was taken into their calculations in the purchase of their droves, and a higher price was given to secure it. It would not be possible to induce the polled condition as an hereditary character, but once present, it could be carried to perfection by selection. No doubt a tendency, however slight, was inherent in the original horned Galloway, and passed down through the line of descent from their remote ancestors; but the comparatively sudden change which took place in the matter of losing the horns seems to point to a stronger and probably an imported influence.

The Galloway and the West Highland breeds are universally considered to be descended from the same original stock. The former are said to be "Highlanders without the horns." This admission associates them directly with the wild forest cattle. Galloway crosses by a West Highland bull have been put with pure-bred Galloways, and the best judges of Galloway cattle have been unable to distinguish the crosses from the pure specimens.

Galloways are known to possess great power of stamping certain characters upon their crossed descendants—for example, the colour and the polled condition. They did not acquire this quality, as improved cattle have usually done, by close-breeding on both the male and the female side. Close-breeding has only been practised within recent years, as may be gathered from the wonderful hardiness of



GALLOWAY BULL, "CAMP FOLLOWER," 5042.
First Prize, Highland Society's Show, Inverness, 1892.
The Property of JAMES CUNNINGHAM, Tarbreoch, Dalbeattie.



GALLOWAY HEIFER, "TIDY V. OF DRUMLANRIG," 11,933
First Prize, Highland Society's Show, Inverness, 1892.
The Property of LEONARD PILKINGTON, Cavens, Dumfries.

constitution possessed by the breed, and also from their being, as a rule, rather slower than some in coming to maturity. No great so-called "improver" ever rose to do work like that of the Collings upon the Galloway breed. The old breeders knew well that to improve them on the lines adopted by shorthorn men, to increase their size and shorten the period spent in coming to maturity by close-breeding, meant ruin to the constitution of the breed in the matter of withstanding the cold and inclement weather to which they are exposed under natural conditions in their native district. It is impossible to obtain excellence in regard to rapid maturity by the usual course, in-and-in-breeding, and retain the hardihood necessary in mountain cattle. This country already possesses an abundance of breeds that fatten quickly, and it would be a misfortune if a breed of animals which now produces the finest quality of beef, often on inferior food and under adverse climatic surroundings, were thoughtlessly and ignorantly sacrificed in the rush for early maturity.

We have not yet seen the final results of the system of in-and-in-breeding which has been going on more or less closely for a hundred years; but the time may come when it will be necessary to go back to such breeds as the Galloway to recruit the ebbing strength of some of the greatest sufferers from the consequences of the practice. Tubercular disease, which is so prevalent and on the increase, is one of the signs that should warn breeders of the peril of a heedless course of inter-breeding.

As dairy cattle Galloway cows are not noted. The quality of the milk is excellent, but the quantity is, as a rule, deficient. Individual instances of cows giving large quantities of milk occur, though calves are generally allowed to follow their mothers; but, as a breed, they have never been managed like dairy cattle. The rage for the extension of dairying during the last half-century has brought about a great diminution in the numbers of this breed, and an increase in the deeper milking Ayrshire. It is asserted, too, that in spite of increased attention during that period, the best animals of the present day show no improvement on the best specimens of former times.

The establishment of a Galloway Herd Book in 1877* has given an impetus in the direction of improvement.

A Cross, bred from a Galloway cow by a bull of one of the favourite flesh-producing breeds, such as Shorthorn or Hereford, is usually an excellent butchers' animal.† The prevailing colour of calves produced by a shorthorn bull, especially if he be white or light in colour, is a blue-grey or uniform mealy roan, polled, and much more like the Galloway than the shorthorn. At times the colour is black, sometimes red or patchy.

The Hereford crosses are also, as a rule, polled, with white heads and red or dark grey bodies. Both crosses produce beef of the finest quality; the Herefords, the smaller animals, being perhaps the finer of the two. The progeny of a Galloway bull on cows of other breeds are, on the average, distinctly inferior, though an in-bred and specially well-bred bull of this breed, has been known to become the sire of cattle out of shorthorn cows that have nearly equalled the performances of crosses from Galloway cows. Galloway crosses from Ayrshire cows are slow and unsatisfactory feeding animals while young, though they are good light-weight butchers' beasts when finished.

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* The editor is the Rev. John Gillespie, Mouswald Manse, Dumfriesshire, who is also the writer of a valuable article on *The Galloway Breed of Cattle* in the "Transactions of the Highland and Agricultural Society for 1878."

† The champion ox at the Smithfield Club Show, 1892, was a cross between a Galloway cow and shorthorn bull, which at the age of 1,250 days weighed 2,276 lbs., an average daily gain from birth of 1.82 lbs.

CHAPTER VII.—MILKING BREEDS OF BRITISH CATTLE —THE AYRSHIRE—THE CHANNEL ISLANDS (JERSEY, GUERNSEY, AND ALDERNEY)—AND THE KERRY.

Introduction—The Ayrshire Breed—Habitat—Early Records—Ayrshires of the Present Day—Breeds imported for Crossing—Influence of Locality on the Breed—Points of an Ayrshire Cow—The Typical Characters of Milking Cows for various purposes—Bullocks and Crosses—The Channel Islands Breeds—The Jersey—Origin—Unimproved Form—Association with Druidical Remains—Remnants of Ancient Civilisations—Purity of Jersey Cattle—Revival of the Breed—The Jersey Island Herd Book—American Demand—Distinguishing Points—Docility of the Cows—Produce Yields—The Guernsey—Compared with the Jersey—Effects of Climate—Guernsey Butter—Inferiority of Islands Cows for Cheese-making—The Alderney—The Old and New Forms—The Kerry Breed—Other Cattle in Ireland—Points of the Common Kerry—The Dexter Kerry—Kerry Crosses—Sale of Kerries in England.

INTRODUCTION.—Though certain strains of cattle already described—notably the Welsh, and the red polled breeds—are good milkers, yet they could not be properly classed among those essentially kept for milk production. We shall find, on the other hand, that some of those which are distinctly and unmistakably milking breeds are nevertheless capable of producing excellent beef. The shorthorn occupies a unique position in this connection, as non-pedigreed dairy cows of this breed are more numerous, taking the United Kingdom as a whole, than all the cows of the special dairy breeds to be described put together.

THE AYRSHIRE BREED

Has come into prominence in comparatively recent times.

Its natural habitat was Cunningham, or the upper of the three divisions of Ayrshire—Carrick, Kyle, and Cunningham—occupying that part of the county which lies north of the river Irvine.

The records*[*] of the early history of the breed fix the date of the beginning of improvement from 1750 to 1780. Before that time the native progenitors of the Ayrshire were small, inferior, irregularly shaped, short and irregularly horned, dark animals, of a black, black-and-white, or brown colour, but hardy, and suited to the humidity and inferiority of the district in which they were placed. The descriptions of this early condition of the breed appear to indicate its relationship to the *Bos longifrons.*

The Ayrshire of the present day, however, is very different, the change having been brought about by crossing with other breeds, and by subsequent careful selection, in addition admittedly to the natural tendency which soil and climate have to develop or maintain certain qualities or characteristics.

The breeds definitely mentioned as having been **imported** and used in crossing with the native cattle are the Teeswater, or early shorthorn, and the Alderney,[†] besides "stranger cattle" of unknown or unrecorded breeds, which were imported by Dunlop of Dunlop, "Orr of Barrowsfield, and other dairy farmers." The resemblance of the Chillingham Park wild cattle to the Ayrshire breed—in horn, in colour, and in form—points to the possibility of there having been an introduction into the Ayrshire breed of blood from some direct descendants of the wild forest

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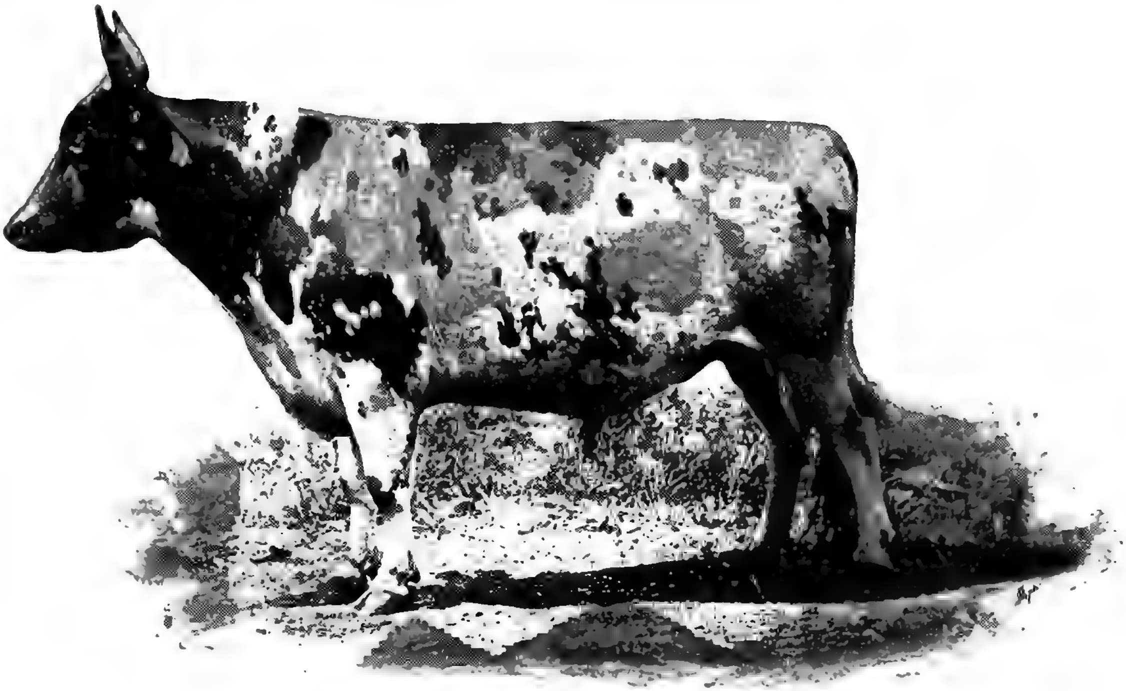
[*] Colonel Fullarton's "Survey of Ayrshire"; Aiton's "General View of the Agriculture of the County of Ayr, 1811"; Aiton's "Dairy Husbandry of Ayrshire, 1825"; Low's "Domesticated Animals," 1845; Farrall's *Essay on the Ayrshire Breed of Cattle* in the "Transactions of the Highland Society for 1876." Ortelius, writing in 1573, speaks of a superior class of oxen in Carrick; but his remarks, no doubt, refer to the ancestors of the Galloway breed, not to Ayrshire cattle as the term is now understood.

[†] Probably more correctly termed the Jersey, as cattle were sent to Scotland, according to Colonel le Couteur, by two successive governors of Jersey—Field-Marshal Conway and Lieutenant-General Andrew Gordon.

PLATE XXV.



AYRSHIRE BULL, "CRAIGS OF KYLE," 1793.
The Property of R. OSBORNE, Drumjoan, Ayrshire.

breed. The improvement in the milking qualities was no doubt largely due to the cross, whatever it was. To it also may in some measure be safely attributed the distinct tendency among improved Ayrshires to become lighter in colour than Ayrshires of a generation ago; indeed, the result is a most natural one to expect when the broad lines of the facts before us are considered.

A little, inferior, dark-coloured, poor-milking breed of cattle is found in a given district; it is improved in size and in milking qualities by crossing with an imported breed, which gives greater variety of colour and a greater admixture of white. During subsequent selection, carried on with the main object of increased milk production, it is most natural to suppose that the animals possessing large proportions of new blood would be favoured and preserved on account of form, size, and good milking qualities; and that along with these would be associated the tendency to whiteness, one of the correlated original attributes of the imported blood.

There are indications that although the Ayrshire is now accepted as a pure breed, all the characteristics contributed by the various breeds employed in its formation have not yet been thoroughly distributed and blended. Proof of this may be seen in the fact that the strains of Ayrshires which are most successful as prize-winners in the "eild"* classes (for bulls and heifers), seldom produce animals which are very successful when shown "in milk."

These cows may give as much milk as those belonging to the strains celebrated for producing successful winners in the classes for animals in milk, but their udders are rarely symmetrical enough to enable them to carry off the prizes, although they possess an advantage over the others in style and in a more perfect form of body.

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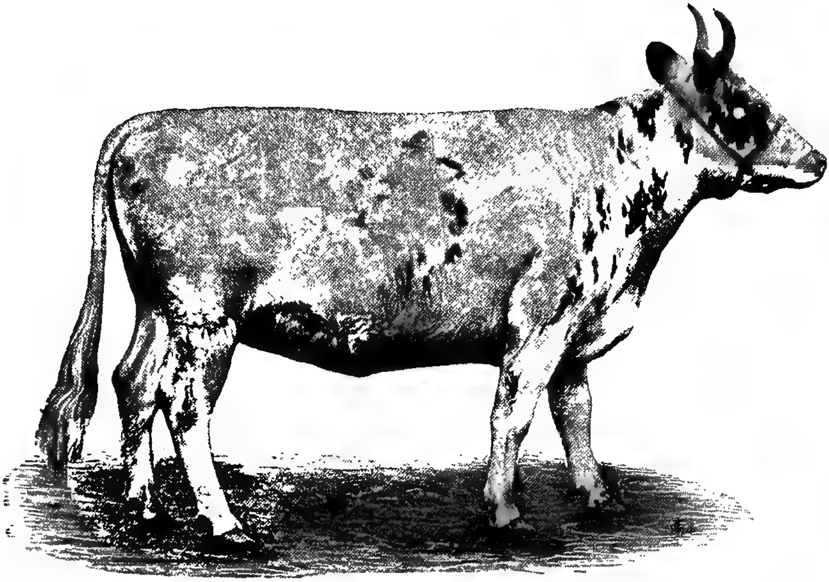
* "Eild" or "yeld," the Scotch expression to indicate cattle, whether male or female, that do not yield milk.

Some of the improved breed, when reared under circumstances of soil and climate suitable for beef production, **fall away** from the true Ayrshire characteristics, assume strong bones, heavy and fleshy forequarters and chest, and also decline in milking powers ; but changes such as these are usually dependent upon local surroundings, and have been already fully explained.

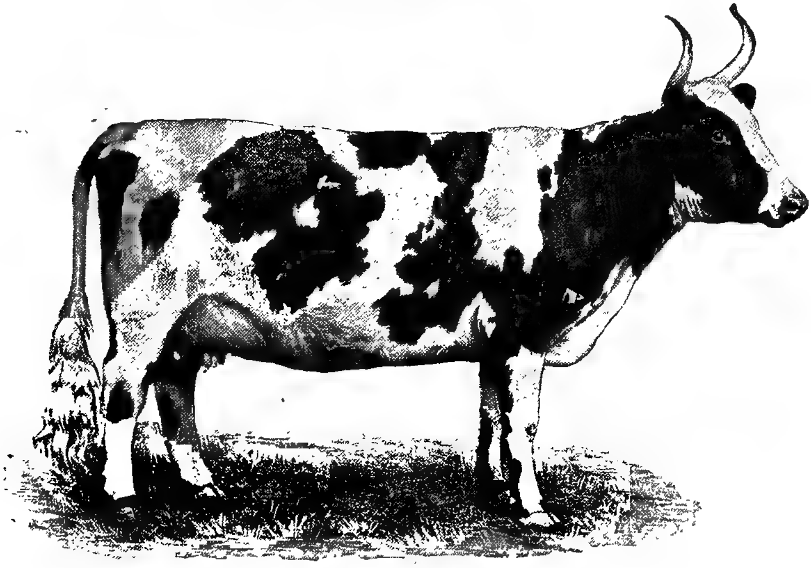
The best preventive of the worst results of the tendency to coarseness through high feeding is to arrange that the heifers shall calve at two years old in place of three years, the ordinary calving time of the breed. Should the calf arrive when the quey is two years old, her milking powers become better developed, and the tendency to produce flesh is checked.

The following are the points of the Ayrshire cow and their values in judging in the show-ring, taken from a report by a committee of the Herd Book Society. The points of the bull differ from those of the cow only in the masculine characters, which, according to the general rule, ought to be distinctly defined.

" 1. *Head* short ; forehead wide ; nose fine between the muzzle and eyes ; muzzle large ; eyes full and lively ; horns wide set on, inclining upwards, ...	10
2. *Neck* moderately long, and straight from the head to the top of the shoulder, free from loose skin on the under side, fine at its junction with the head, and enlarging symmetrically towards the shoulders, ...	5
3. *Forequarters*—shoulders sloping ; withers fine ; chest sufficiently broad and deep to ensure constitution ; brisket and whole forequarters light ; the cow gradually increasing in depth and width backwards, ...	5
4. *Back* short and straight ; spine well defined, especially at the shoulders ; ribs short and arched ; body deep at the flanks, .	10
5. *Hindquarters* long, broad, and straight ; hook-bones wide apart, and not overlaid with fat ; thighs deep and broad " [but thin of flesh on the inner thigh or twist] ; " tail long, slender, and set on level with the back, ...	8
Carry forward . . .	38



A.—AYRSHIRE TWO-YEAR-OLD HEIFER, "NELLIE OF BARCHESKIE."
First at the Dumfries Union Show, 1888.
The Property of AND. MITCHELL, Barcheskie, Kirkcudbright.



B.—AYRSHIRE COW, "BERTIE II. OF CLOCKSTON," 3217.
The Property of Sir MARK J. STEWART, of Southwick, M.P.

Brought forward . . .	38
6. *Udder* capacious, and not fleshy, hinderpart broad" [and rounded like the side of a cheese]. "The whole firmly attached to the body; the sole nearly level, and extending well forward; milk veins well developed; teats from 2 to 2½ in. long, equal in thickness, and hanging perpendicularly; distance apart, *at the sides*, equal to one-third of the length of the vessel, and *across* to about one-half of the breadth, ...	33"
[Small teats are now considered most objectionable, both in the market and the show-ring.]	
"7. *Legs* short in proportion to size; bones fine, and joints firm, ...	3
8. *Skin* soft and elastic, and covered with soft, close, woolly hair, ...	5
9. *Colour* red, of any shade, brown, or white, or a mixture of these—each colour being distinctly defined. Brindle, or black and white is not in favour, ...	3
10. *Average live weight* in full milk about 10½ cwts., . .	8
11. *General stylish appearance* and movement, . . .	10
Perfection,	100"

The Ayrshire is unquestionably the most important and the **most typical** example of a milking cow in the British Isles. She shares with the Kerry the credit of being able to yield a greater return of dairy produce on poor land and inferior food than any other cow. She is essentially a cheese-dairy cow, on account of the comparatively small-sized butter globules of the milk and the abundance of curd-making material which it contains. The Channel Islands breeds supply, on the other hand, the true butter-dairy cows, owing to the large-sized globules which the specially rich and highly coloured cream contains. In the same way the milking shorthorn is the typical cow for towns' dairying, for the supply of large quantities of milk of moderate quality for immediate domestic use, and for the accumulation of beef of second quality as a bye-product during the latter portion of the milking period.

Ayrshire bullocks feed well after they are three years old, and so do crosses with the shorthorn bull even at an earlier age, and produce excellent beef; but Ayrshire steers are not often met with, as the bull calves are usually sold for a few shillings as "slinks" (newly born calves), and killed when a day or two old. Many are never allowed to drink milk, but are killed immediately after birth, and sent for consumption into the large centres of population.

There is a Scottish Ayrshire Herd Book and also an American Herd Book, which, no doubt, tend to improve the quality of the breed, and also to maintain its purity.

CHANNEL ISLANDS CATTLE—

JERSEY,* GUERNSEY, AND ALDERNEY.

These cattle have for many years been imported into England under the generic name of Alderney, although the animals from that island have been throughout the least important. The misnomer is supposed to have originated either from Alderney cattle having been the first sent to England, or through English officers being stationed in Alderney, and thus identifying all the kindred breeds by the name most familiar to themselves.

The Fowlers, who have been the great exporters of stock from the Islands, perpetuated the custom by naming all their cattle from the Islands "Alderneys."

The Jersey.†

This is the most numerously represented and most important of the three breeds, which at some distant date

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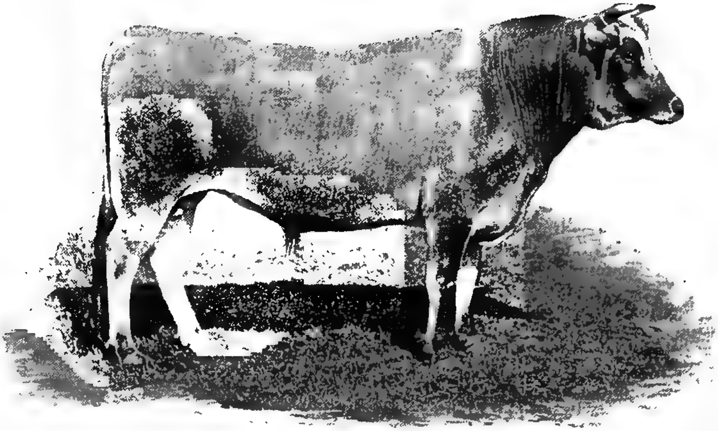
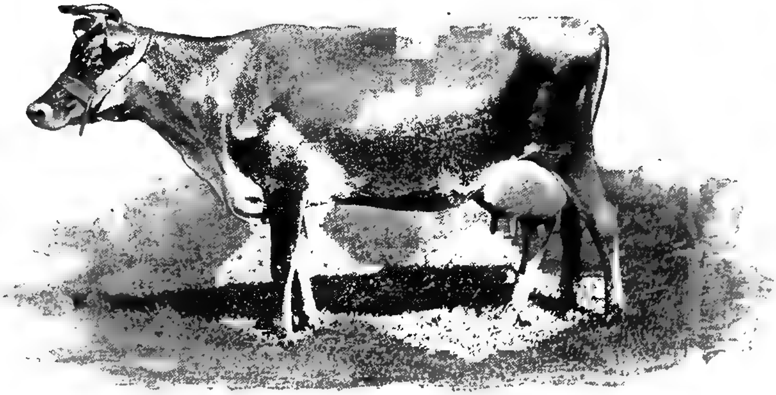
[*] Articles on Jersey cattle appear in the 1880 Report of the Agricultural Department, Washington, and the Journal of the *Royal Agricultural Society*, 2nd series, vols. xiv., xvii., and xxi.

[†] For much information the Author is indebted to the exhaustive treatise on the history of the Jersey breed of cattle by John Thornton, being the introduction to the first volume of the English Herd Book of Jersey Cattle, 1880.



A.—JERSEY BULL, "DISTINCTION'S PRIDE," 1486, I.H.B., H.C.
First Prize, Royal Agricultural Society's Show, Warwick, 1892.
The Property of JAMES BLYTH, Wood House, Stansted.



B.—JERSEY COW, "PONTORSON."
The Property of LORD ROTHSCHILD, Tring Park, Herts.

sprang from a common origin, in which the Brittany breed of the adjacent French coast participated. Some specimens of these animals so strongly resemble Channel Islands cattle, although very inferior in milking qualities and the development of good dairying appearances, that they have been sold in large numbers in this country as Islands cattle, to the detriment of the good name of, and injury to the trade in, the genuine animals. The "whole" or "self" colouring, and the light shades which prevail in the improved Jersey are of comparatively recent date, and have been encouraged by the American buyers, who are partial to them.

The original unimproved Jerseys described by the early writers * were variously coloured, "commonly red or red and white, occasionally cream-coloured or cream mixed with white, black with a dingy brown-red about the nostrils and on the back ridge," and also "black, and black and white."

Thornton calls attention to the similarity of colouring, and to the correspondence in the appearance of the older forms of the Brittany, Kerry, Welsh, Cornish, Shetland, and Ayrshire breeds. He further points out that these are usually located in the vicinity of ancient Druidical remains, and that there is a strong presumption that they are the most direct descendants of the small-sized, shorthorned, dark-coloured descendants of the *Bos longifrons* which, being the earliest domesticated of the aboriginal cattle of Great Britain, was, no doubt, the milch cow of the Druids. This is a most ingenious and feasible suggestion. They are found clinging to existence on the fringes of civilisation in out-of-the-way corners, where they and the associated Druidical remains would naturally meet with least interference during the many disturbances which overwhelmed, altered, and destroyed the features of the more accessible interior of the country.

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* Thomas Quayle, author of "The General View of the Agriculture, &c., of the Islands on the Coast of Normandy, 1812." Garrard on "Varieties of Oxen common to the British Islands."

Jersey cattle have been bred pure for a longer period than any of our British varieties, on account of the importation of foreign cattle to the island being forbidden by law. In 1789 the " Act of the States of Jersey " detailed severe prohibitive penalties against the fraudulent importation of cattle from France, which effectually enforced the already long-standing regulations dealing with the trade.

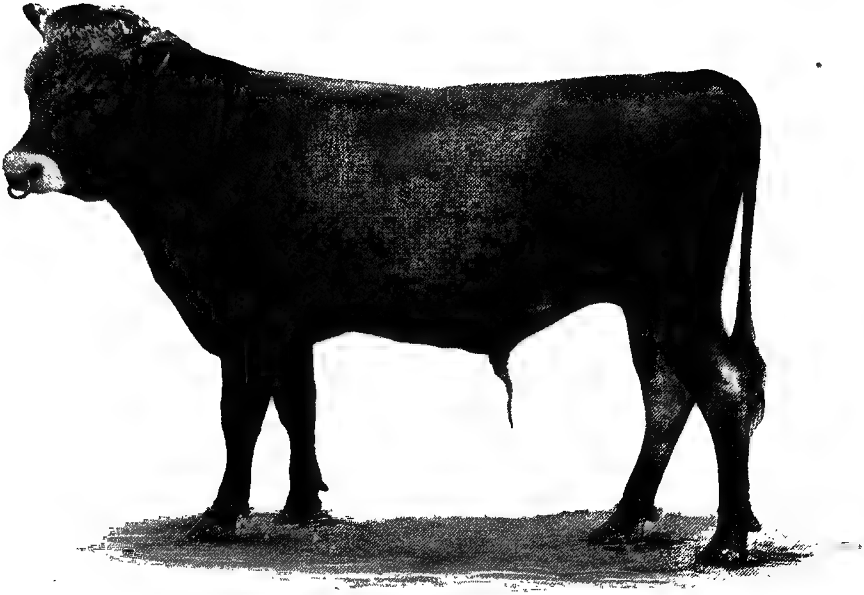
During the first three decades of this century Jersey cattle **degenerated.**

The great revival of the breed was brought about by the formation, in the autumn of 1833, of the *Jersey Agricultural and Horticultural Society*, to the efforts of which, through its stringent regulations with regard to the qualities which an animal must possess before receiving the stamp or decoration of merit, is due, in the first instance, the marked improvement which took place soon after that time.

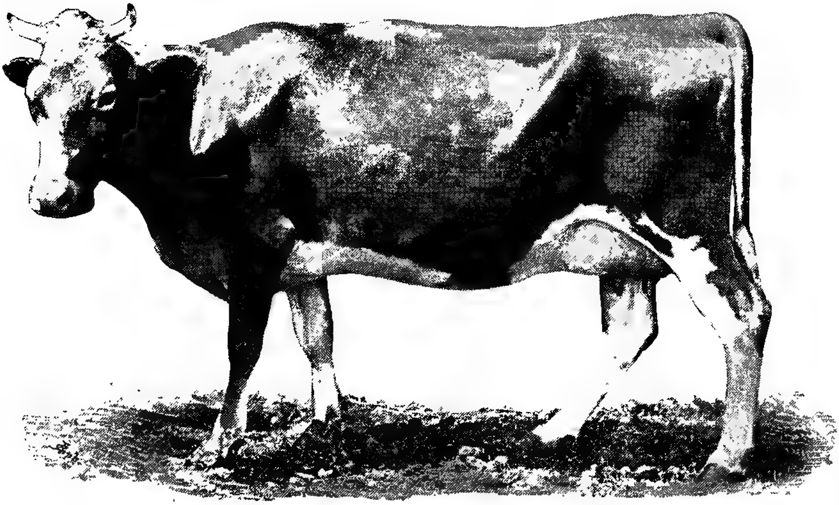
The Jersey Herd Book, begun in 1838, no doubt materially contributed to this gratifying result, and the unshapely form of the old-fashioned Jersey was speedily changed to that of the symmetrical and handsome creature of the present time.

The milking qualities, always good, were also improved by the careful selection of bull calves from the best milking cows.

About 1853 a demand sprang up in America for Jersey cattle, and one leading endeavour of the Board of the Agricultural and Horticultural Society has since been, owing to the increase of this demand, to encourage breeders to keep, at least for a time, their best stock in the Island, so as to secure the retention of a share of the best blood.



A.—Jersey Bull, "Queen's Messenger," 1206, E.I.H.B.
The winner of many Prizes.
Sold by Geo. Simpson, Wray Park, Reigate, to Dr A. Meadows.



B.—Alderney Cow, "Beauty," 76.
First in the Heifer Class at the Royal Show, 1886; and First as a Cow in 1887.
The Property of P. Herivel, Magistrate, Alderney.

The following are the points in which Jersey cattle differ materially from the general form and characteristics of the Ayrshire, already stated in detail:—

Points taken from the Descriptive Part of the Ratio Scale for Cows and Heifers in the Jersey Herd Book.

1. *Muzzle* dark and encircled by a light colour—what is termed "mealy mou'ed" in Scotland.
2. *Horns* small, crumpled; yellow, with black tips.
3. *Ears* small and thin, and of a deep yellow colour within.
4. *Chest* broad and deep.
5. *Hide* thin and mellow, and of a yellow colour.
6. *Teats* yellow.
7. *Hair* fine and soft, and of various, usually though not invariably, whole colours—fawn, silver-grey, dun, cream, or white, in addition to rare specimens which are more or less black.

The whole form is handsome and deerlike, and the shades of colour being bright and uncommon, Jerseys are, irrespective of their milking powers, favourite park cattle.

The milk, though not usually abundant, is noted for a large proportion of cream of peculiarly rich quality and colour, which makes the cows favourites in many private household dairies throughout the country. A few are also kept in ordinary farm dairies, where specially rich milk is wanted or where butter is the manufactured product, to make the churning of the cream more easy, and to give the Jersey tint and flavour to the butter.

The cows are extremely docile, owing to their being constantly tethered at pasture in the Island, while the bulls are remarkable for their bad temper and ferocity. No doubt this is one explanation of the old custom which involved the destruction of bulls before they were three years old, as a precautionary measure of safety to human life. Another reason advanced to account for this practice is that the bulls, while young, had so many cows put to them that they became used-up and worthless.

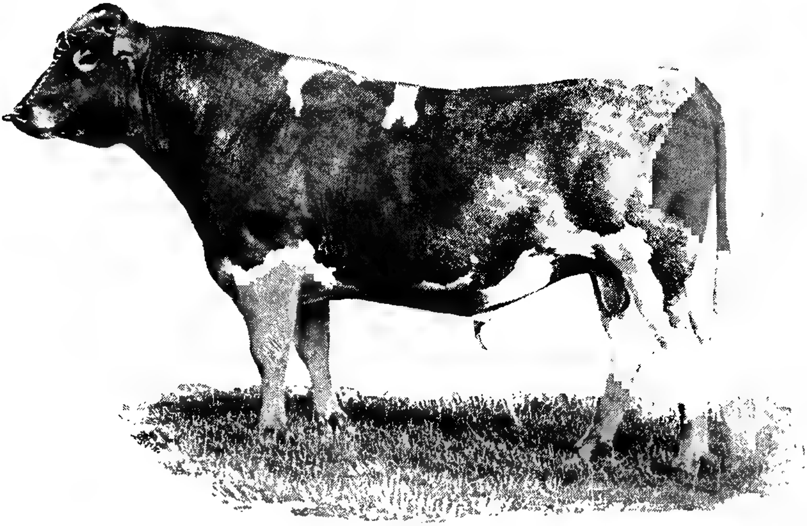
The general average of produce during the best part of the milking season may be stated at 10 to 12 quarts of milk per day, yielding from 7 to 9 lbs. of butter per week, although it is not unusual to find individual cows in this country which will double the average; and in America, owing to the extraordinary system of cramming with milk- and butter-producing-foods, some even treble it. In reaching the extraordinary height of butter production, amounting to over 30 lbs. for a single cow per week, the life of the animal is frequently sacrificed by over-forcing in the effort to reach a record which will afford a good trade advertisement for the sale of the descendants of her living produce.

The Guernsey.

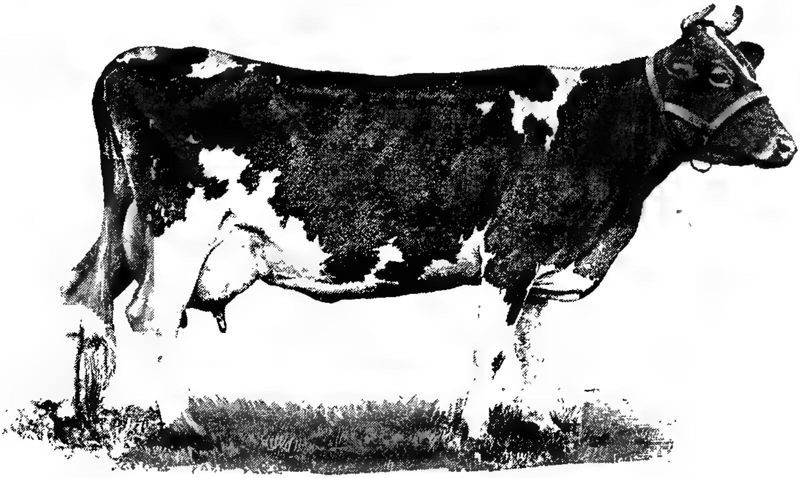
This is a larger, stronger-boned, and coarser animal in appearance than the Jersey. Its outlines are not so regular or symmetrical, but in addition to good milking qualities—the sole possession of the Jersey beyond its good looks—the Guernsey adds no mean capacity for beef production when not giving milk. The meat is not of first-rate quality, being yellow in the fat like that of the Jersey.

The colours of Guernsey cattle are more "broken" than those of the Jersey, patches of white appearing on the predominating light yellow, brown, or fawn. The muzzle is flesh-coloured.

The climate of the island is not so genial as that of Jersey, and consequently the cattle are hardier, and more inured to cold and exposure on their arrival in England than those from Jersey. The latter become acclimatised in a few years, and their descendants are likewise hardier, but



A.—GUERNSEY BULL, "CLIMAX," 14, E.G.H.B.
Winner of seven First and one Champion Prizes.
The Property of THE EXPRESS DAIRY COMPANY LIMITED, College Farm, Finchley.



B.—GUERNSEY COW, "LADYBIRD II.," 388, E.G.H.B.
Winner of two First Milking Prizes at the Dairy Show of the B.D.F.A.
The Property of THE EXPRESS DAIRY COMPANY LIMITED, College Farm, Finchley.

they also lose the refined delicacy of skin and form, and become stronger in frame and altogether coarser.

Guernsey butter is considerably deeper in colour than Jersey butter. This quality, along with the possibility of selling the calves at a better price than Jersey calves, owing to the thin condition of the latter, has raised the Guernsey in favour with dairy farmers. A further inducement is the greater weight of the animal, as compared with the Jersey, as it gives better results when dry and fed for beef. But in estimating the various qualities of the breeds some overlook the fact that five Jerseys can be kept on about the same amount of food as four Guernseys or three shorthorns.

For cheese-making purposes, the milk of the Islands cows, owing to the large size of the cream globules, is inferior to the milk of the Ayrshire or shorthorn.

The Alderney.

This animal in its genuine form corresponded much to that of the Jersey. It is darker than either of the other varieties, the hair being usually dark brown or black, and the nose, tongue, and teats black. There is a tendency in this as in the other Islands breeds to become lighter in colour.

THE KERRY BREED,

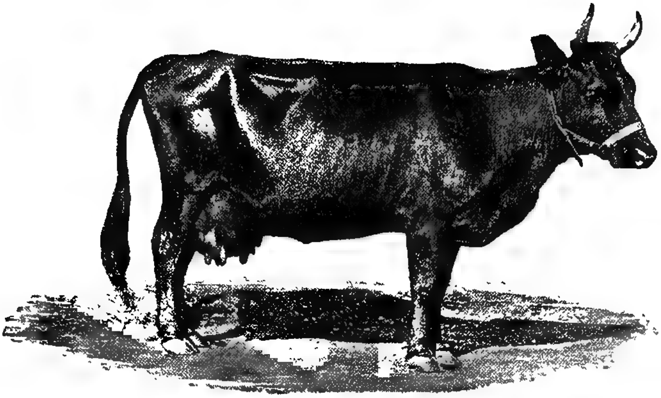
From the mountainous region in the south-west of Ireland, is the only pure remaining Irish breed.

The predominating cattle of Ireland are shorthorns, the blood of which has been more or less mingled with that of the ancient Irish breed, which at one time, to a large extent, belonged to the longhorn. The last twenty-five years has seen an enormous improvement in the feeding qualities of the general run of Irish bullocks brought over in large numbers, and sold at fairs and markets in both Scotland and England.

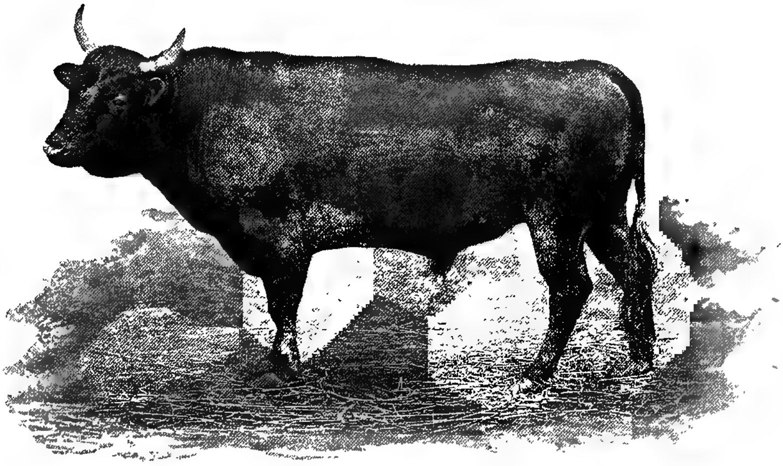
In some secluded districts, such as a poor tract of moory and unreclaimed land lying to the west of Cork, the old Irish milch cow, a breed anterior in time to the longhorn in the island, is yet to be seen in a form which does not appear to be much changed by the introduction of foreign blood. These animals are thin fleshed and slow to feed, but yield on inferior fare a considerable quantity of poor milk. Their horns are of medium length, thin and "spaley." The hair, usually brown, has single white hairs more or less mixed with it, and a ridge of white along the line of the backbone: a characteristic which is common among Irish cattle other than shorthorns or their best-bred descendants. The longhorn breed possessed it, and, when Low wrote, it was an acknowledged point of the Kerry, though it has disappeared from the best Kerry blood of recent years.

The Kerry is "the poor man's" or the Irish cottier's cow, especially in cold and inferior districts; but the breed also possesses the power of beef production in an eminent degree.

Points.—The true Kerry colours are orange skin with black hair, though specimens with red-brown hair do occur in the purest blood, but more frequently in the Dexter variety than in the other. White patches also appear from time to time, but stringent regulations against white markings passed by the Royal Dublin Society exclude from entry in the Kerry and Dexter Herd Book all Kerry bulls which are not pure black, with the exception of a few grey hairs about the organs of generation in animals of exceptional merit, and all cows and heifers which have white on any part of the body, with the exception of the udder. In general outline the Kerry has much in common with the Jersey, and also with the Ayrshire, though in size it is,



A.—KERRY COW, "FLORA."
First at the Royal Show in 1887; First at the London Dairy Show in 1885, and again in 1887.
The Property of MARTIN J. SUTTON, of Reading.



B.—KERRY BULL, "PADDY BLAKE."
Was the Property of the late LORD CLONMELL.

under its home conditions, smaller than either of the two. Its spare form indicates its superiority in milking rather than in beef production. The horns are fine and waxy, yellow or white, with sharp black tips, curving gracefully upward.

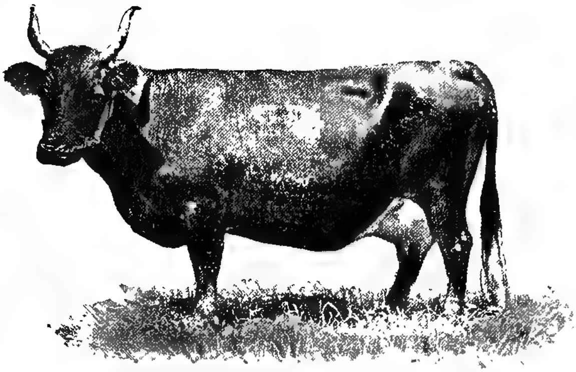
The Dexter variety, though now distinctly, in the breeders' acceptation of the term, a pure Kerry, whatever may have been its origin, is a much more compact, more substantial, and lower-set animal than the Kerry proper. Its toes turn in after a peculiar fashion, and it tends to walk over the outer digits, especially in the case of the hind feet. The leg-bones are shorter and more substantial, the neck thicker and shorter, the horns heavier, not so elevated and airy, and the head heavier and not so deer-like as in the case of the original Kerry.

Low, in 1845, states the prevailing belief as to its origin to be that it was introduced (whether through crossing or selection was not known) by one Dexter, an agent of Maude Lord Hawwarden; but a considerable amount of doubt exists as to the accuracy of the statement. The Author, while travelling in Kerry some years ago, found that the word "Dexter" was used in a generic sense with reference to all diminutive animals, even to men if low-set and bandy-legged; and also that the term was in the first instance applied to short-legged sheep kept by a resident Coastguard officer.

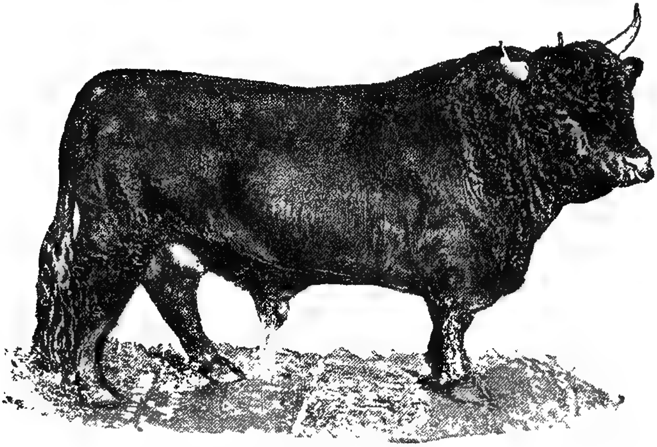
Kerries cross remarkably well with other breeds; with the British flesh-producing breeds for fattening cattle, and with the milking breeds—Channel Islands and Ayrshire—for dairy cattle. The cross animals, when at a little distance, often strongly resemble West Highlanders. This is additional evidence of the common origin of the breeds.

Kerries have in recent years attracted great attention in England as fancy cattle, and have on more than one occasion been specially taken notice of by Royalty. James

Robertson, of Malahide, near Dublin, has, as a recreation and a change from the ordinary routine of business, been largely instrumental in bringing the breed into prominence by exhibiting good specimens of it at the Royal Agricultural and the London Dairy shows, and also by carefully selecting the young and undeveloped members of the purest and best sorts at the Killarney and other western fairs, and shipping them when they come into sale condition to supply a growing demand in this country.

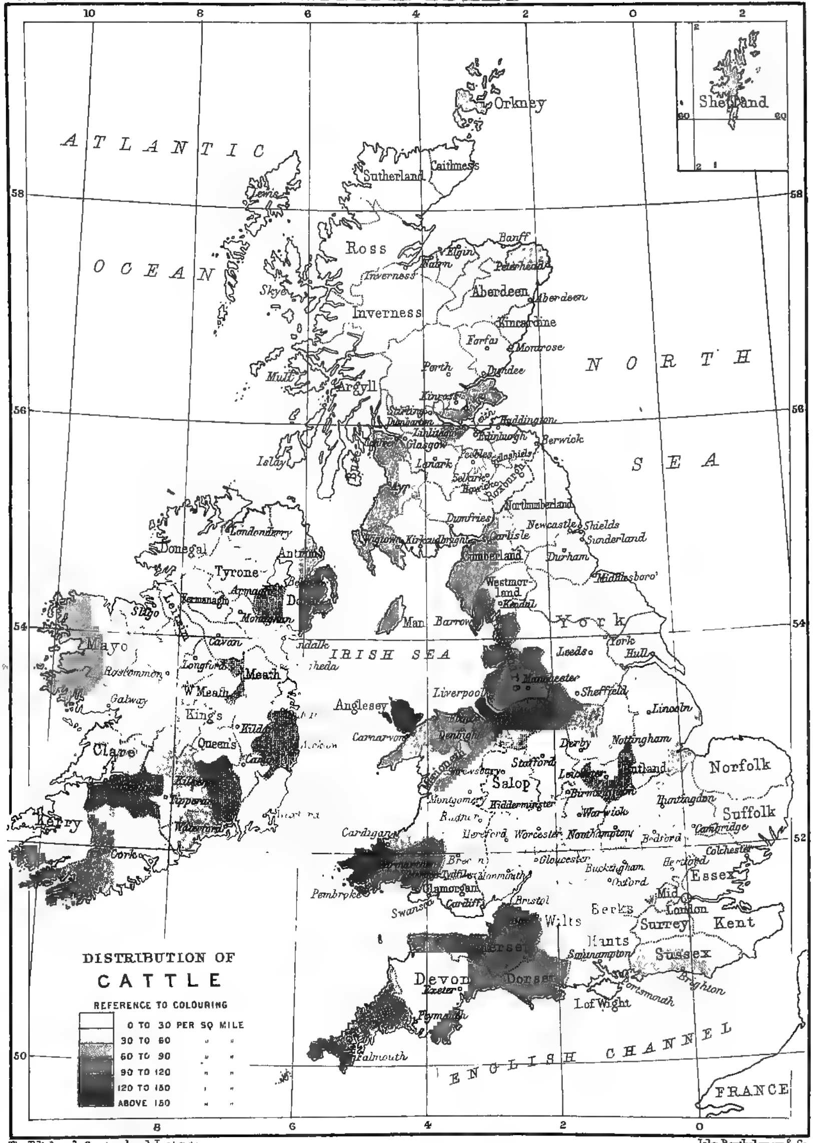


A.—DEXTER KERRY COW, "ROSEMARY."
Never beaten but by "Irisene,"
The Property of MARTIN J. SUTTON, Reading.



B.—DEXTER KERRY BULL, "PARADOX," AT FOUR YEARS OLD.
The Property of MARTIN J. SUTTON, Reading.

BRITISH ISLES



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CHAPTER VIII.—THE BREEDING AND MANAGEMENT AND GRAZING OF CATTLE.

Breeding and Management and the Grazing of Cattle—Calves—Methods of Rearing—Diarrhœa—White Scour—Treatment of the Growing Calf—Ringworm—Lice—Grazing Cattle—Early Maturity—Points of Feeding Animals—Grazings in this Country—Symptoms of Disease in Grazing Cattle—Acorn Poisoning—The Warble Fly.

IN **a system of good management** it is essential to employ stock of good quality, though for ordinary purposes not necessarily belonging to the strains of blood most run upon, and, consequently, commanding the highest prices. Dealing in fancy animals and fancy prices, is more or less a special business involving some degree of speculation, and requiring special skill and an abundance of spare capital, such as the ordinary farmer does not possess.

A calf should have its mother's milk, and that only, for the first three or four days. "Beastings" or colostrum—the milk secreted during the few days after calving—is the best food for the calf, and it is unfit for other purposes. It frequently contains streaks of blood, especially in the case of heifers of the first calf. Butter can be made from "green milk" rather sooner than cheese, but it is a mistake to use milk from a newly calved cow for any purpose than that of feeding calves, until it becomes normal in composition and will boil without coagulation.

In rearing, calves may be—(1) tied by the neck; (2) kept in small cribs singly; or (3) let run together, loose, in a large, dry, well-ventilated place. When loose they are liable to suck each other about the navel, which produces enlargement and often rawness of the part. To prevent this, calves are sometimes muzzled by putting on a bridle with sharp spines projecting upwards from the nose, to prick other calves and prevent them standing to be sucked. It is a good practice to give artificial food, such as finely ground cake, immediately after the meal of milk, to take up the attention of the calf until the strong instinctive desire to suck passes off. Hay-racks and small boxes for cake should be fitted up on the side of the wall of the crib or calf-house at convenient heights.

Concrete makes the best floor for all cattle houses, being easily cleaned. There should be sufficient fall into open channels in preference to covered drains, to prevent urine stagnating in pools. The channels should be regularly swilled out to prevent the occurrence of sour or putrid odours, which are specially objectionable in a calf house.

Three common methods of Rearing Calves:—

1st Method.—Allowing the calf to suck its mother. This is the most natural way, and produces the best calves, but is expensive, and the calves grow up wild unless frequently handled. There is a greater mortality when foot and mouth disease breaks out among sucking calves than among hand-fed ones, as a change to healthy milk cannot be made if the mother becomes affected, and the virus of the disease in such milk acts as a blood-poison to the calf. Bulls and pedigree show-stock, especially in beef-producing breeds, are often allowed to suck, usually foster-mothers. Less milk given in this way suffices, as compared with hand-feeding, and "farrow" cows giving little milk may rear good calves. Two calves are often fed at the same time by one cow when she yields a plentiful supply of milk. After the first two are weaned, another pair may be put to the cow, and finally a single one as the flow of milk lessens at the end of the season. Sometimes the last of the milk is drawn away by hand, and is richer in cream than the first part. A cow which suckles a calf is none the worse for milking purposes in the following year, although some dairymen are prejudiced against cows which have been so treated. Should a cow be sucked for a number of years, the milking qualities are liable to be impaired.

2nd Method.—Giving full milk alone, newly drawn from the cow, when the milk is about 90° F. A calf is taught to drink from a pail by giving it a finger and keeping its lips down in the milk, so that while sucking the finger it draws in the milk. In a few days it will drink without the finger. An ordinary shorthorn calf should receive for a day or two a daily allowance of ¾ gal. of milk divided into three meals. The calves of smaller breeds require smaller quantities. Milk should be given in moderate amounts at first, to encourage the calf's instinctive desire to satisfy the cravings of hunger to develop, and thereby train it to drink freely. Increase should consequently be gradual. Some calf-rearers only feed twice a day, although it is better to do so three times. The amount should be increased to 2 gallons by the end of the fourth week, and to 2½ at three months; then the calf may be weaned by gradually reducing the amount. Some continue to feed with milk for six or even nine months, in the case of pedigree stock, including young bulls, which require to develop quickly to suit show and market purposes. Dry cake and long food are also given in gradually increasing quantities when the calf is old enough. This method is expensive, and therefore not much practised. Fattening calves should have as much milk as they will drink, and they should also be kept quiet and in the dark.

3rd Method.—Giving the full milk of the mother for a few days, and finishing with fortified skim milk or milk substitute. The calf at birth should be rubbed with straw, or simply covered up with straw, to keep it warm until it dries, and the cow should not be allowed to lick or even to see it, as this unsettles her when the calf is at last removed. Many allow the calf to suck for three or four days and then take it away; but the cow is apt to fall off in milk, the flow of which does not always return to the full extent. When the calf is a week or ten days old, the new milk may be gradually reduced, and skim milk, made up to a proper proportion by artificial substitutes, such as boiled gruel, given at a temperature not exceeding blood heat. It is a good practice to begin with a tablespoonful of boiled linseed until the stomach is accustomed to digest solids; a larger quantity would cause indigestion. An excellent mixture to follow the linseed, as the calf grows older, is half and half linseed meal and pea meal, also given after cooking. Linseed cake ground to meal may be used in place of linseed meal, and may then form two-thirds of the mixture. Oatmeal is a good ingredient, but it is more liable to produce acidity if the feeding is not well and regularly attended to. Cotton-cake should not be used; it kills young calves, as they cannot digest it. One gallon of skim milk per day with mixed meal, gradually increased to one pound and then to two pounds, is enough for an ordinary calf before weaning. In the last stage, sweet whey is sometimes substituted for milk, or one quarter of the meal may be the Lactina preparation. Calves are fond of the latter, but it seems to be rather dear, and the cooking of it requires great care that the water to be used in mixing is quite boiling, else calves fed on it scour and get thin in condition. Much less milk than that stated above is often made to suffice. The milk from one Ayrshire cow, aided by artificials, has been known to rear sixteen calves in one season; and in the summer of 1884, a good shorthorn cow, in the neighbourhood of Horsham, supplied all the milk given to twenty-four shorthorn cross calves. This is carrying the use of milk substitutes rather far, when separated milk is to be had at extremely moderate prices. However useful substitutes may be, when an animal is a few weeks old, there is no doubt that to follow Nature's plan of feeding mostly on milk in the early stages of the life of a calf is the most economical.

A deadly diarrhœa, which often assumes a contagious form, is not uncommon amongst calves. It usually appears where the sanitary arrangements are defective, but it may also be induced when this is not so, if the cows are too highly fed, or if the food is impure or inferior to such a degree that the system becomes fevered, so that an abnormally large proportion of albumen is present in the milk. The albumen becomes precipitated in the calf's stomach, and is made hard and indigestible by the acidity which develops. The irritation throughout the alimentary canal, no doubt intensified by some alkaloid poisoning, induces death within a few hours.

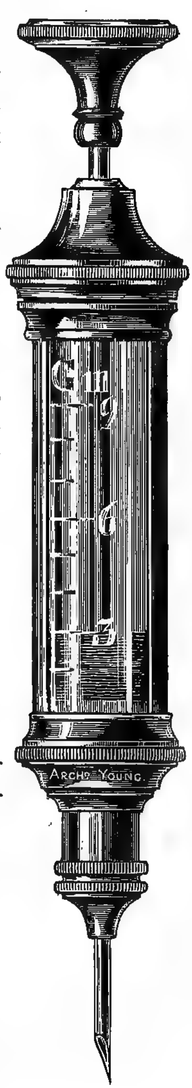
Treatment must be directed towards the restoration of the normal condition of the cow, and while this is progressing, to treating the milk so that the excess of albuminoids and other deleterious matters is rendered innocuous. This may be to some extent accomplished by a favourite local but successful method of "burning the milk" by stirring each pailful with a red-hot bar of iron.

White scour (associated with *Tympanitis* or "hoven" from indigestion) often breaks out even in sucking calves, when they begin to eat hay. A young calf's stomach is too small, and it is also in other respects unsuited for digesting such food. Green forage or silage, in place of hay, is better; but when a calf is a few weeks old hay of fine quality may be used in moderate quantities. In the case of hand-fed calves the milk should be given oftener than twice a day. The undigested curd produces a light colour of fæces, the acid in the stomach having expelled the whey, and made the curd hard and cheesy.

Remedies.—In young calves, diet by feeding often and reducing the quantity of food supplied at each meal, giving boiled starch and less cream if the milk be rich. Administer a stimulant and purgative, such as a mixture of powdered rhubarb and magnesia, 4 drachms, along with 15 to 30 grains of ammonium carbonate, two or three times daily in flour gruel. Two to 4 oz. of castor oil may at times be substituted for the rhubarb and magnesia; and, when calves are older, 4 to 6 oz. of Epsom salts, and ¼ oz. of gentian and ginger powder, may be given.

All calves should be taught to eat linseed-cake before weaning, in order to make the change as slight as possible at that time; and each may be allowed 1 lb. per day all summer, especially when the land is subject to anthrax or black-leg. The cake keeps the animals thriving all the time, and they are in consequence less liable to contract disease. A seton put into the dewlap is also widely believed to be a preventive, although the reason of its success is not satisfactorily explained. Castration should be performed when the calf is about a month old; if much older, the animal ceases to thrive for a time. When the operation is not performed till strong masculine characteristics develop, the resulting steer (then called a "seg") is reduced in market value, owing to its bull-like appearance and coarseness of flesh.

Bulls should be taught to lead before they are a year old, either by "bulldogs" or "humbugs," or by a ring put through the gristle dividing the nostrils. At a year they may serve heifers or small cows, but if not quite large enough should not be allowed to take an advantage, say on a hill side or slope, as a bull, under such circumstances, is liable to fall and injure his back. Bulls are now more docile than of old, in a great measure owing to their being more gently treated. While at service they should be maintained in good store condition, and each may have daily, according to size, up to 6 or 8 lbs. of mixed meal or bruised grain.



PROFESSOR W. O. WILLIAMS'S INTRATRACHEAL INJECTION SYRINGE (REDUCED ONE-FIFTH).

With this they are usually more sure, and get better calves than when fed on cake.

Calves should be housed for the winter early in October, when cold nights come, to save flesh and to prevent "hoose," or to render it less severe.

Treatment of "husk" or "hoose" (which is denoted by the unthriving appearance of the animal, a husky cough, and a discharge from the nostrils): keep warm, feed well, and give turpentine (½ oz. to 1 oz.), soaked into dry meal, and then mixed with cold gruel; repeat once, or perhaps twice, after an interval of a few days. When given in this way the risk of choking from turpentine is reduced to a minimum.

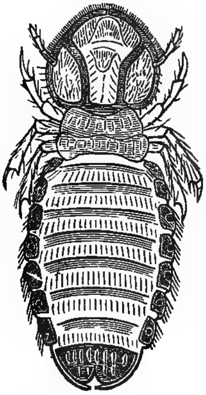
Another effectual remedy is Intratracheal Injection, consisting of—

Olive Oil, . .	100 parts.
Oil of Turpentine, .	2 parts of each.
Chloroform, . .	
Pure Carbolic Acid,	

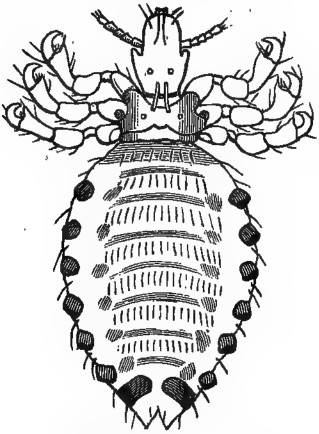
The sharp point of the syringe is thrust through the skin and the wall of the trachea (windpipe) in the middle of the neck, and 2 to 4 drachms of the mixture are injected into it. The operation may require to be performed three times, with an interval of three days between two operations.

Young cattle are particularly liable to ringworm in winter if in poor condition, as imported Irish often are. White scaly patches without hair appear (most abundantly about the head and neck) as the result of the growth of a vegetable parasite (*Trichophyton tonsurans*), which may be destroyed by the application of one or other of the following dressings:—Red mercurial blistering ointment made up with a double supply of lard; paraffin oil; carbolic oil; hot lime made into a thin paste and spread on with a flat-pointed stick; or even treacle smeared carefully over the surfaces of the affected parts. The last destroys the organism, by excluding the air which is necessary for its existence; the other substances directly poison it. The inside walls of the cattle-shed must be whitewashed with fresh lime after an outbreak of ringworm, otherwise the cattle wintered in it the following year will be affected. The organisms producing ringworm also adhere to gates and rubbing-stones in the fields, and are in this way transferred to fresh lots of cattle in succeeding seasons, if preventive means are not taken.

Lice of two common species appear on British cattle—(1) the large, or broad-bodied, or sucking ox-louse (*Hæmatopinus eurysternus*), which lives by piercing the skin and sucking blood; and (2) the small or biting ox-louse (*Trichodectes scalaris*), which has biting jaws in place of a sucking mouth, "and feeds on the decaying portions of the cuticle and hairs," and not on blood. Both are insects with six legs, and both do injury by causing irritation, the sucking one to the greater degree. If cattle of any age are allowed to become too lean, kept too hot in a close house, or fed for a time on insufficient food, as barley-straw or flying-bent (*Molinia*), or any other inferior hay, they are liable to become infested with lice (usually both varieties together), most abundantly about the rump, head, neck, and shoulder tops. Lice may be destroyed by one or two dressings, well rubbed in, of train oil, sour buttermilk, black soap, or any of the various carbolic dressings. Paraffin oil is effectual, but requires special care in application. Anything which would injure the cuticle or poison the animal in the event of its licking the skin, which it should do regularly, must be avoided. Serious losses have at various times occurred among stock through poisonous dressing, such as blue mercurial ointment, being applied to the skin.



SMALL BITING OX-LOUSE
(*Trichodectes scalaris*).



LARGE SUCKING OX-LOUSE
(*Hæmatopinus eurysternus*).

(*After Drawings made by Professor Allan Harker, Cirencester.*)

Weak cattle, or those of a soft temperament (usually kept back from feeding by their neighbours and thriving badly), should be removed and placed apart.

In the case of young cattle, a moderate amount of cake may be continued, say 1 or 2 lbs. daily, during the first winter, if straw is the fodder used. If plenty of good roots is given, the cake may be reduced or omitted.

GRAZING CATTLE.

It is more difficult to judge of the quality or value of store cattle than of fat ones. The most important rules for guidance in this matter cannot be learned by reading. A man must come to understand animals instinctively through long experience, and intimate connection with them, to be able to judge of the possible outcome from the appearance at any time. In buying, one ought to learn how the beasts have been kept for some months previous to the time in question, and never take those from a better climate or which have been accustomed to better food than is to be had in their new quarters. Cattle moderately fed, and not kept too warm in winter, are generally acknowledged to have done better when the end of the grazing season comes than those which have been well fed but kept in close byres, when the hair tends to fall or rub off too early in the season, leaving them too little of their natural hirsute protection when turned out to grass in spring. Those that lie out all winter often in the end do best, if not too lean at the beginning of the season; the extra constitution gained by being out and living under more natural conditions enables them to make up more than the winter's loss of flesh. To those not fed on cake during winter, a few pounds per day, given for five or six weeks before they go out, affords a good start, and "comes out" afterwards in "extra condition." Cattle at three or four years old come more quickly to maturity than two-year-olds, and "kill better" than they look, having more internal fat, and being "better made up," though they do not necessarily lay on a greater average of beef in a given time during the period of their existence. Three-year-old grazing cattle are now difficult to procure unless from poor land, high or cold districts, where it would not pay to force by artificial feeding, and where breeds exist in which maturity is slowly reached.

Early Maturity.—The propriety of making beasts prime at two years, or of allowing them to be three or even four years old before finishing, must be determined entirely by the quality of the natural products of the farm, the climate, and the tendency to the laying on of flesh in the animals suited to those surroundings. It would be absurd, and it would never pay, to try to force a Galloway or West

Highlander to maturity at two years, when kept in its native conditions. Time must be allowed for the purpose of overcoming local natural disadvantages. It would be an equally bad practice, with a good climate and the best of food at hand, where animals of a breed accustomed to mature rapidly would do best, to keep them a year longer than necessary. A large proportion of food (and in this instance expensive food) is burnt up to supply the waste of the system ; so that keeping animals till three years old, when by proper management they could have been fat at two, increases the loss by at least one-third of food substance used up in maintaining animal vitality.

The points of a good feeding animal are very much those already described, under general points applicable to all flesh producers. M'Combie says, the following denote slow feeders : " Deep neck ; thick legs [' trousery '] and tail ; thick skin, with hard hair and hollow eyes."

Grazings in this country may be divided into three qualities—(1) *First-rate pasture*, which is rented at 3 guineas, 4 guineas, or in some instances (which are admitted not to be numerous) even 5 guineas per acre. The extent of this land is not great, and much of it is annually let by auction. It is found in Leicester, Nottingham, Somerset (the marshes), the fen land in Lincoln and Cambridge shires, on parts of the Old Red Sandstone of Herefordshire, and in many small areas along the banks of rivers. These pastures are capable of feeding large bullocks without cake, and often less than an acre per bullock is sufficient. Sometimes an extra sheep per acre is put on. Sheep eat numerous weedy plants in pasture which cattle reject, for example, ragwort (*Senecio Jacobæa*), knapweed (*Centaurea nigra*), and oxeye daisy (*Chrysanthemum leucanthemum*). The grass season, in England, is from about 1st May till the beginning of November. At first, if the growth of grass is backward, a little hay may be given with advantage.

Thistles, nettles, and all large weeds should be cut regularly before seeding, and tufts of coarse grass also mown. Dung can be either spread or carried off to prevent the growth of dark green "tathy" patches. It is considered a sign of good land to have a perfectly even surface, and a very close cover, which should not be allowed to become too long. Very fine pasture has a velvety feeling under foot. Two lots can be made prime fat on the same land in one season—the first going off by the first and second week of July, having gained, without receiving cake, from 8 to 10 stones of beef. The land is allowed to clean by resting for ten days.

The second lot of cattle not being so far forward or so good in spring as the first, would, while the best cattle occupied the best pasture, be kept on pasture slightly inferior to it. These require a few lbs. of cake, as the grass begins to fall off in quality at the end of September and in October. Some graziers think it pays to give cake to cattle even on the best pasture throughout the whole season, but this must entirely depend upon the rent of the pasture and the relative prices of cake and beef.

A few rough beasts (perhaps one to four or five acres) kept to clear off rough grass, run out all winter, and do remarkably well, if sheltered from cold winds, and if a little fodder be given in times of storm.

The Shelter necessary is either natural—as trees and depressions in the ground, or artificial—as stone walls, hedges, and shelter-sheds. In Leicestershire, straw is sometimes thrown under the hedges to make a comfortable bed for cattle in summer.

(2.) *Second quality pasture*, suited for feeding the lighter breeds or smaller animals, is rented at from £2 to £2. 10s. per acre. If these are being finished they should have cake all the time (beginning with 3 or 4 lbs., and ending with 6 or 7 lbs.) given in troughs moved regularly from time to time to different parts of the field, to distribute the manure equally. By giving cake, beef is produced faster, and of better quality ; the land is also gradually improved by the increased amount and value of the droppings, and will consequently "carry" more stock.

(3.) *Third quality pasture*, rented at from nearly £2 down to a few shillings per acre, is only useful for keeping store cattle or sheep, or, in some localities, dairy cows. The land is often good, but the climate unsuited for fattening-beasts. Besides hill and mountain lands the various downs belong to this class.

Symptoms unnatural to healthy Cattle at Grass, and which may be seen without handling them :—

(1.) An animal away by itself, if accustomed to go with others, and perhaps cowering behind a wall with its back up.
(2.) „ „ not stretching itself on being quietly raised.
(3.) „ „ with hair standing on end, "staring."
(4.) „ „ showing the absence of lick-marks on the hair.
(5.) „ „ with saliva flowing from the mouth.
(6.) „ „ not feeding or chewing the cud for any length of time.
(7.) „ „ thin in condition of body.
(8.) „ „ blown out by gas formed through stoppage of digestion.
(9.) „ „ with a peculiarity in the movement of the head or limbs.
(10.) „ „ with quick breathing, or a cough.
(11.) „ „ with hollow sides consequent upon want of food.

The hollow condition of a heifer "a-bulling," from want of settling to feed, must not be mistaken for disease. She then stands quietly while another of the herd jumps upon her, and she in turn tries to jump on others, which, however, do not stand.

In addition to visible signs, the extremities, including the horns, may be cold, and the skin tight and cold to the touch; the temperature may also rise from the normal state (100° or 102° F.) to 105° or 106° in the more ordinary forms of disease, such as pleuro-pneumonia or foot-and-mouth disease, or even to 110° in a case of rinderpest.

Pleuro-pneumonia is a highly infectious disease of the lungs of cattle, and, on *post-mortem* examination, is characterised by more or less pleurisy, accompanied by pneumonia, which causes consolidation of the lung substance, and in section presents a marbled appearance. On the examination of a microscopic section, the blood-vessels and air tubes are seen to be completely filled with an inflammatory coagulated exudate. The country has been freed from the disease by the energetic action of the Board of Agriculture, under the able direction of the first Minister of Agriculture, the Right Hon. Henry Chaplin. Some authorities, who have had experience of the success of inoculation as a preventive of the disease, believe that the end might have been accomplished at less cost, though probably not so quickly, had the systems of inoculation and of slaughter been judiciously practised together.*

Broncho-pneumonia† is a disease which has recently been brought into prominence in this country, owing to its frequent recurrence among live cattle imported from Canada and the United States of America, and on account of its having been repeatedly mistaken for pleuro-pneumonia. The difference in the *post-mortem* appearances and in the actual seats of the two diseases makes it extremely unlikely for any one versed in morbid anatomy to mistake the one for the other. In pleuro-pneumonia contagiosa the true

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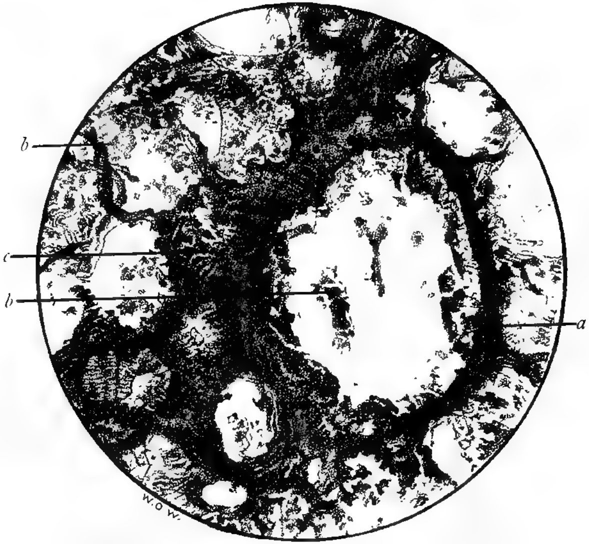
* For a description of the practice of inoculation, see the Author's work on "The Agriculture and Rural Economy of Australia and New Zealand."

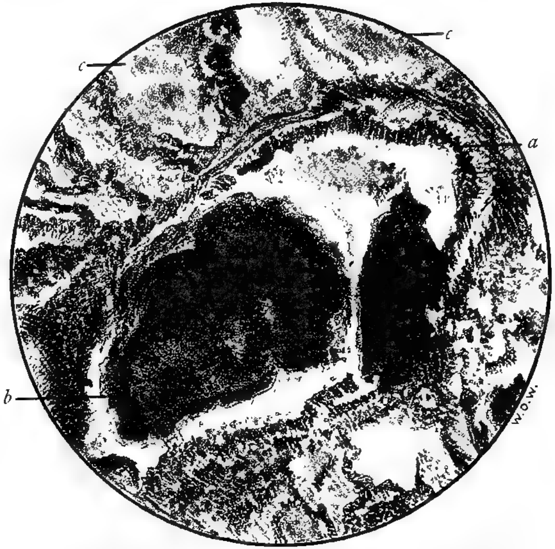
† For complete details of appearances, &c. &c., see Williams's "Principles and Practice of Veterinary Medicine," 8th edition. Menzies & Co., Edinburgh.

PLATE XXXII.



B.—BRONCHO-PNEUMONIA AS SEEN IN "CORN-STALK" DISEASE.

a. Bronchial walls, epithelium desquamating and shed.
b. Catarrhal products in tubes and vesicles.
c. Increased fibrous tissue– fibrosis.



A.—PURE PNEUMONIA AS SEEN IN PLEURO-PNEUMONIA.

a. Healthy epithelium of bronchus.
b. Fibrinous plug.
c. Air vesicles containing croupous—fibrinous—exudate.

Taken by permission from Williams, "Veterinary Medicine," 1893. Photo-Micrographs by W. Forgan.

seat of the disease is not in the bronchial tubes, although the smaller of these become gorged, as already stated.

Broncho-pneumonia is not a "specific" disease like pleuro-pneumonia contagiosa, but one which originates spontaneously when animals are exposed to cold and wet,* especially after being heated, as cattle are during transit by rail and sea. It may fitly be compared with influenza in the human species, not of the epidemic type, but of the old and familiar form of a severe cold. It is termed "cornstalk disease" in America, because it appears in autumn, when the cornstalks are past their best, and beginning to decay. The true seat of the disease in broncho-pneumonia is the air passages, large and small. Although the lung-parenchyma, through which the multitudinous ramifications of the air tubes pass, naturally become congested, it is not subject to such changes as are found in a case of pleuro-pneumonia contagiosa. It is very different with the bronchial tubes, more especially the smaller of them. The columnar cells forming the epithelial lining of the air passages desquamating, or, in common language, peeling off, indicates the seat of the disease. As the alteration of structure does not extend to the blood-vessels, nature may in time repair the injury, if death be not induced at the acute stage of the disorder.

Not only is the fibrinous exudate of pleuro-pneumonia absent in the air passages, but pus and degraded epithelial *debris* take its place, and are expelled from the lungs by the act of coughing in a manner corresponding to expectoration in a human being. The differences described are readily determined by the aid of the microscope, but there is a plainly visible characteristic difference in the *post-mortem* appearances in the two diseases, which under ordinary circumstances is sufficient to guide the observant practitioner.

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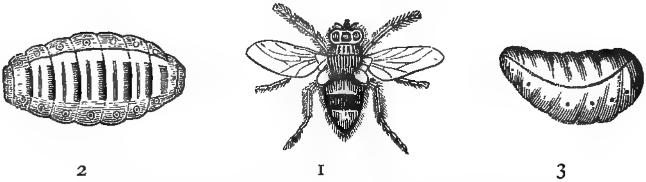
* *Vide* a treatise by Dr Frank S. Billings on "cornstalk" disease, in which the cause is attributed to a micro-organism which is found on the leaves of maize; but as the organism is probably one of the commonest kind, there is not sufficient proof that it is actually the cause of the injury.

Acorn poisoning takes place when large quantities of green acorns are blown down early in the season from oak trees growing in pasture. Serious loss from death often occurs among young stock through the irritation produced in the stomach and bowels due to their consumption of immature acorns as food. After a storm of wind the cattle should be moved to pasture away from oak trees, and the fallen acorns must be collected (for the use of pigs during winter) before the animals can be safely returned.

Yew tree leaves at certain periods of the year are deadly poison to cattle and horses, and the same remark may be applied to the foliage and pods of the laburnum.



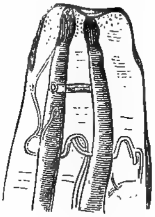
1. Ox Warble Fly; 2. Maggot; 3. Chrysalis.
(*After Drawings by Miss Ormerod.*)

The Warble Fly or Bot Fly (*Hypoderma bovis*, De Geer) is the source of great discomfort to cattle, and of enormous annual loss, estimated at millions of pounds, to the farmers of this country. Miss Ormerod, who has so ably brought its evil consequences and the means of prevention before the British public, says:—

> "It is a two-winged fly, upwards of half an inch in length, so banded and marked with differently coloured hair as to be not unlike a humble bee. The face is yellowish; the body, between the wings, yellowish before and black behind; and the abdomen whitish at the base, black in the middle, and orange at the tip. The head is large, the wings brown, and the legs black or pitchy, with lighter feet."

The female possesses a long ovipositor, with which during summer she most probably pierces the skin and plants an egg, which " is oval and white, with a small brownish lump at one end."

Subcutaneous irritation begins in early winter. The young warbles are placed with the head down and the tail up in connection with breathing tubes, which open on the surface of the skin. They are easily destroyed, and the earlier the better, by the application of some liquid such as MacDougall's Dip or strong salt brine, which will run down the tubes and poison the inmates; or the mouths of the tubes may be closed up by some sort of greasy material. If this were largely practised, the injury resulting from the flies existing in such enormous numbers might be undone in a few years. The flies can be prevented from striking by applications, rubbed in once a week along each side of the backbone (the favourite seat of attack), of such things as train oil, or a mixture of linseed oil, sulphur, and carbolic acid. Paraffin and kerosene are useful only for a short time, as the smell goes off rapidly.



BREATHING-TUBES OF WARBLE MAGGOT MAGNIFIED.

Mercurial ointment, unless applied with great caution, and in the smallest possible quantity, is liable to produce poisoning, through the animals licking it off.

As the weather becomes warm, the maggots force themselves out from beneath the skin and drop to the ground, where they assume the chrysalis form, of a dark colour. The fly appears in about three or four weeks if the season is warm and favourable. If a united and strenuous effort were made by owners of cattle in all parts of the country to get rid of this painful and irritating pest, it might, though with some difficulty, be as entirely stamped out as pleuro-pneumonia or foot-and-mouth disease.

CHAPTER IX.—HOUSE-FEEDING OF CATTLE.

Methods of Housing—Dishorning—Time to House—Regularity in Feeding—Roots—Concentrated Food—Necessity for Grooming—Amount of Food to give—M'Combie's Method of Feeding—Cost of Feeding per Week—Lawes and Gilbert's Experiments—Calculation showing Food and return in Beef—Conclusion dealing with the Relations of Live Weight to Dead Weight—Function of Live Stock.

THERE **are three common methods of arranging cattle** in a house to feed :—

1st, Tying by the neck in a byre, either in stalls or without divisions between them.

2nd, Putting them in loose boxes, one in each.

3rd, Leaving them untied, several together, in a shed, with an open door and an open or partially covered court.

In a byre, they may be arranged, if in more than one row, either with the heads turned towards a passage up the centre of the house, or with the heads to the side walls, with or without a feeding passage in front. It is a mistake to have double stalls more than 7½ feet wide, even when the cows are large ; for smaller animals, 7 feet is sufficient ; and for Ayrshires, 6 feet. Six feet is long enough for the largest stall, with 2 ft. 6 in. of additional space in front for a manger to hold fodder. When the stall is too long the animal lies down in its droppings, and becomes matted with dung on the thighs and legs. The manger (or feeding trough, of glazed earthenware, say, 18 inches wide) should be placed low down, so that it will not interfere with the animal in rising, or prevent the head resting comfortably during sleep. The bottom ought to slope towards the stall, so that cake when given may be within easy reach, to prevent the animal trying to place its fore feet in the trough. The space in front, a foot in width, in addition to the trough, provides room for bulky fodder, which is so liable under other circumstances to fall down and be trodden.

Ventilation is of paramount importance, and can be secured by an arrangement of holes in the walls near the floor level, together with openings in the roof. Where the heads are close to the wall, it is well to have a 1½-inch drain pipe through it, low down between the cows in each double stall, and inclining upward, so that the current of cold air passes over them.

Boxes (each 10 feet square, to hold one) are best for all kinds of stock except young "stores," and might be more generally adopted if it were not that the expense is great, owing to the amount of surface area taken up. Litter (cut, if convenient, to lengths of 6 or 8 inches) is given to each animal in a box, at the rate of 20 lbs. per day, while for those kept in open yards a sufficient amount is 40 lbs. each. In a byre it is not positively necessary to allow any, although cattle keep rather cleaner behind with it than without it, and if properly attended to it also protects the leg joints of heavy cattle from injury on the floor.

Open sheds, with uncovered courts, may be—

1*st*, Large, sufficient to accommodate ten, twelve, or more animals, and sometimes designated "Reeds";

2*nd*, Small (called "Hummels" in some parts), to contain from two to four animals in each.

Sheds, with open courts, are most comfortable for stores or for feeders in very hot weather. The great objections to them are—(1.) The loss of manure by rain-washing, which, however, may be in a great measure prevented if the water from the eaves of the houses adjoining the court be removed, so that it is unnecessary to provide any outlet drainage, and an ample layer of litter be spread on the floor. [Contrary to the general belief, surplus moisture tends to rise to the surface through the animals puddling, and a comparatively dry layer is found at the bottom of an open courtyard.] (2.) The extra straw required for litter; and (3.) Strong cattle bullying, and consequently starving the weak ones.

Dishorning should be practised on all cattle that are to be housed in this way, as they persistently torment each other, and frequently inflict severe injury by horning their neighbours. When the horns are well developed and strong, the sharp tops are frequently nipped off by a pair of powerful shears. This method is quicker, more simple, and less painful, because shorter in duration, than that of sawing the horn, but the bruised condition in which the wounded horn-core is left is objectionable, as it is liable to lead to serious after-consequences. In the case of calves and young animals, the budding horns should be wholly removed by a knife getting well down underneath the base of the core of the horn. When the operation is delayed for twelve months or more, a fine saw, such as is used for severing the bones in butchers' meat, should be employed, the animal having been thrown in the usual way with hobbles or ropes, and made fast. The operation is not a pleasant one to witness, but the pain, though acute at the time, is over in a few minutes; the temperature as a rule does not rise above normal, unless in the case of a limited number of animals, in which suppuration takes place; and the opening into the frontal sinuses made by cutting through the hollow base of horn-core is closed by clotted blood, and the wound heals and skins over in a few days. When the work is properly and skilfully executed, the pain and bleeding are reduced to a minimum, the gain to the owner is distinctly appreciable, and the reduction of the sufferings of the animals from the savage dispositions of their stronger companions is enormous. It is estimated that no less than two hundred thousand cattle and horses are killed annually in the United States of America by "horning" or "hooking,"

Skull and Horn of an Ox, to illustrate the operations of "Dishorning," "Half-horning," and "Tipping."

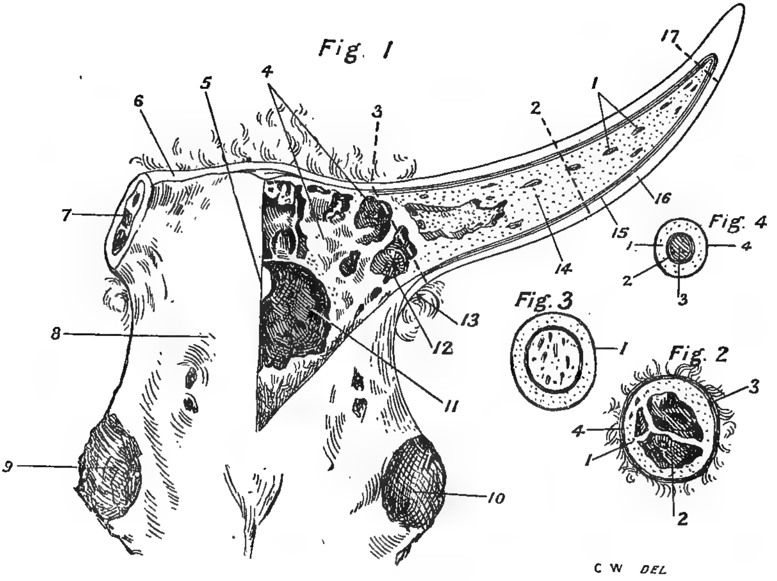


Illustration * exhibiting a triangular section of the Frontal Bone excised to show the bony structure behind; the Right Horn removed, as it ought to be, in dishorning; and the Left Horn bisected to show its internal parts.

Fig. 1.—1. Blood-vessels; 2. Cut made in "Half-horning;" 3. Cut made in "Dishorning;" 4. Bony Walls of Frontal Sinuses; 5. Position of Spinal Column; 6. Skin; 7. Part from which the Right Horn has been excised; 8. Frontal Bone (Forehead); 9. Orbit of Right Eye; 10. Orbit of Left Eye; 11. Brain Cavity (2½ inches in this case from the Wound made in Dishorning); 12. Frontal Sinuses (or Cavities in the Skull containing air, and opening into the Nasal Cavity); 13. Region where the Trunk Nerve and the two main branches of the Artery enter for the supply of the Horn; 14. Bony Horn-core (insensitive when healthy, but extremely painful when diseased or congested); 15. Corium, a sensitive membrane, corresponding to the true skin; 16. Insensitive Horn; 17. Cut made in "Tipping."

Fig. 2.—1. Bone; 2. Sinus; 3. Skin; 4. Section made by "Dishorning."

Fig. 3.—Section made by "Half-horning."

Fig. 4.—1. Horn; 2. Corium; 3. Bony Horn-core; 4. Section made by "Tipping."

* After a Drawing by C. Ward, M.R.C.V.S., made under the direction of Prof. W. O. Williams.

which must be accompanied by a serious amount of suffering on the part of the unfortunate victims. It is a relic of barbarism of the worst kind, for which there is no excuse, to shut up in a close place, where escape is impossible, a number of fully armed beasts to deliberately maltreat and maim each other. This is a matter which is well worthy of the consideration of the Society for the Prevention of Cruelty to Animals. Polled cattle have been appreciated on the American prairies because of the immunity enjoyed from the enormous losses resulting to cattle from goring by their horned neighbours, and because horns are liable to become frost-bitten and diseased, and the animals bearing them worthless in consequence.

Dishorning is practised chiefly as a preparation for the shutting of cattle in confined courts, but it is capable and deserving of great extension, more particularly in the Irish branch of our live stock trade, owing to the close proximity of animals during shipment, and to the evil dispositions which they display when collected from all parts of the country, and formed into herds, the individual members of which are strangers to one another. It has been estimated upon good authority that there is an average loss of 5s. per head, due to horn wounds and bruises during transit, on Irish cattle brought over to this country. With us the operation is almost exclusively confined to steers, but in the United States of America, where it has become deservedly popular in recent years, even high grade Channel Islands and other horned cows are artificially polled in the manner indicated, without any perceptible injurious results. It is somewhat anomalous that by the laws of Scotland and Ireland dishorning is legal, while in England it is illegal.

Cattle should be housed in the north by the end of September. In the south they should be taken in before the beginning of November. It is a fatal error to leave feeding beasts out at night in early winter without proper protection from the inclemency of the weather. Not only do they lose flesh rapidly, but when housed they take a considerable time to recover from the shock or "backset" received before they begin to thrive. A man at 15s. or 16s. per week can tend thirty to forty bullocks tied in stalls if the food be close at hand. He can undertake the feeding and management of sixty to seventy if they are untied.

Regularity in feeding is of the first importance. Too much should not be given at one time, and any food that is left should be carefully removed. Each supply of food ought to be consumed before the animal leaves the feeding-trough. This allows time for rest in which to chew the cud and to prepare for the next meal. All changes of food should be made gradually. Liberal allowances of turnips given without due preparation are liable to produce scour. Clover, if wet and in excessive quantity, produces hoven and often death, from rupture of the rumen, or more usually from suffocation induced by the pressure of the distended stomach suspending the action of the diaphragm.

White and yellow turnips should be consumed first, as swedes are sweeter and keep better for winter and spring use. With fattening cattle one can never return with success to an inferior food, therefore, in the gradation of changes in food materials, whether roots, cake, meal, or long fodder, the last to be used should always be the most attractive to the animal's palate. Of the various roots mangels keep best, and are best for spring use. Roots should be stored in good time in autumn, for if exposed to frost they are injurious to all classes of stock, especially when kept in the house. Roots are usually only given in quantity sufficient to supply water to the system—1 cwt. per day to an ox is about the limit, while $\frac{3}{4}$ cwt. is often enough. Potatoes should not be washed (as earth, in this instance, acts as a corrective or aid to digestion), nor given in large quantities, as they are, on account of their starchy nature, difficult of assimilation.

Roots may be given whole to amuse the animals, sliced to save waste of energy (as some bullocks, with a specially anxious or greedy disposition, are liable to leave their troughs in a disagreeably wet condition, owing to the escape of saliva while consuming whole roots), or pulped and mixed with chaff the day before, and left to ferment slightly, to raise the temperature in cold weather. Some feeders think cattle like the mixture best when newly prepared, while others object to the practice except with young store beasts, saying that the quality of flesh in cattle coming into prime condition is reduced in market value by giving pulped roots.

The concentrated food should be chosen according to what is cheapest in the market, and may consist of a selection from the following or other common food stuffs:—Cotton or linseed cakes, maize meal, " Indiana " or " Paisley " meal, wheat, oats, barley, beans, peas, gram, lentils, and linseed, ground into a fine state of division to be more easily digested. Whole grains, which have escaped the action of the teeth,* come through cattle undigested. All the above substances may be given dry, spread on the chaff in the feeding-troughs; the rough and the short food are then consumed together. When the fodder is inferior, as in the case of barley straw in Norfolk, the chaffed straw and the meal may be mixed in a heap on the floor, and boiling water sufficient to wet it, though not to drain away, thrown over it. By covering up the heap and leaving it till next day the whole mass is well cooked, and made palatable and more digestible.† A little locust bean meal may be added to the mixture to sweeten it, but not too much, otherwise it causes the animals to neglect the unsweetened food.

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* In the Western States of America, pigs, two to each bullock, are often kept solely on Indian corn which they pick out of the droppings of cattle. In other cases, when the corn is bruised, they eat the dung.

† For full details of the wonderful success of this system of feeding, see a lecture by the Author, printed in the *Journal of the Newcastle Farmers' Club* for 1886.

Treacle is a good fattener, and may be used, when cheap (£5 or £6 per ton), as a relish. It is useful in moderate quantities, say 1 to 2 lbs. daily to each animal, for maintaining the digestive organs in a healthy state, and it is quite as effectual, when necessary, in restoring them to a natural condition, if given once or twice in quantity, 6 to 8 lbs., mixed with a little hot water to undo its viscosity and make it flow easily. Cane sugar* is, if possible, better liked by cattle than treacle, and it is more easily manipulated, but it is too expensive for ordinary feeding. As a rule, the best mixture of concentrated food is half cake and half meal. Some prefer giving pure cake for one feed in the day to make greater variety in the food. Having begun with a little, say 2 lbs. per day if given for the first time, good feeders gradually increase every few weeks, as a fixed quantity of concentrated food gradually loses its full effect; 8 or 10 lbs. per day is a good final amount to reach with an ordinary bullock near the finish; more than 10 lbs. leads to a distinct waste. The return after a certain point is passed is in inverse proportion to the amount supplied. Much forcing of young animals, even for fattening, is under ordinary circumstances a mistake, and it is infinitely worse in the case of breeding stock. It is best simply to keep them thriving throughout. Heifers feed faster than bullocks, especially when young. The great drawback is their coming in season and not feeding for a day or two each time they do so, and, if loose, keeping others that jump on them from settling to feed properly. The ancient and excellent practice of "spaying" or de-sexing heifers for feeding purposes has been to a great extent discontinued in this country; but it is clearly one of those simple old-time practices the revival of which would lead to an important conservation of wealth to the owners of grazing cattle.

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* See a paper by Sir J. B. Lawes in the *Journal of the Royal Agricultural Society of England*, 1885.

Tied-up cattle ought to be groomed regularly, especially about the rump, shoulder-head, and neck, or generally such places as they cannot conveniently or at all reach with the tongue to lick. They should be kept quiet, and at a uniform temperature of about, but not over, 60° F. If the hair be very rough when they are first put up (as is often the case when the animals are left during the first part of the winter in a strawyard, until room is made in the stalls by the sale of those which finish first), the back, half-way down the ribs, the thighs, and the tail, may be clipped bare. This removal of hair prevents excess of sweating, which naturally takes place at first on cattle being introduced into a warm shed from an open court: and they can be more easily kept clean, and, consequently, feed faster; but in some markets where the practice is not understood the appearance produced might be a drawback in selling.

A heifer or bullock which would yield 40 to 45 stones of dressed beef, if put up to increase 14·4 lbs. of beef per week,* should receive on an average 6 lbs. of a mixture of cake and meal per day (beginning with 4 lbs. and finishing with 8 lbs.), ¾ cwt. roots, 1¼ stone straw (partly chaffed), or when expedient a limited portion of this replaced by hay of equal money value—a small foddering once a day—but it will not pay to give fattening cattle hay worth £4 or £5 per ton.

The following was **M'Combie's method of feeding.**—At 6 A.M., or earlier, half the artificial mixture was given; in about an hour, when this was eaten, one-third of the roots; at 12 o'clock another one-third of the roots; at 5 P.M. half the mixture of cake and meal; and at 9 P.M. the remaining roots, and perhaps a little rough hay in the racks. Uncut straw was provided during the day as well as chaff.

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* Classes are provided at Chicago for cattle under a year old, an example not followed at Smithfield. The greatest daily gain in weight is made by calves under a year old, and the Chicago results show that a shorthorn calf weighing 993 lbs. at the age of 335 days had gained 2·96 lbs. daily; a Hereford, weighing 934 lbs. at 330 days came next, having gained 2·83 lbs. daily. The weight of the calves at birth are here included.

Depending on the condition of the store animal at first, three to five months may be taken to finish prime, and an increase of from about 15 to 28 stones may be made by this method of treatment.

Calculation showing Cost of Feeding per Week.

			S.	D.
Per day.	3 lbs. cake* and 3 lbs. meal, or 42 lbs. a week, at ⅔d. per lb.	=	2	4
	¾ cwt. roots, or 5¼ cwts. per week, at 4d. per cwt. .	=	I	9
	1¼ st. straw, or 8¾ st. per week, at 1½d. per st. .	=	I	I
Attendance, ...			0	6
	Cost of producing 14·4 lbs. of beef, .		5	8

Or about 5s. 6d. per imperial stone of 14 lbs.

* Cake or meal at 1d. per lb. = £9, 6s. 8d. per ton; at ¾d. per lb. = £7; at ⅔d. per lb. = £6, 14s. 6d.; roots (consuming value) at 4d. per cwt. = 6s. 8d. per ton; straw and litter averaged at 1½d. per st. = £1 per ton.

Sir J. B. Lawes and Dr Gilbert showed by experiment many years ago that it required from 12 lbs. to 13 lbs. of dry substance of food to produce 1 lb. of increase of live-weight in oxen; but their more recent investigations make this amount of food too high by a few pounds, and the proportion is more correctly stated at 9 or 10 lbs. of dry food substance to 1 lb. of increase.

Applying this reduced rule (of say 1 lb. live-weight per 10 lbs. of dry food) in the following calculation, we arrive at the results shown below:—

Calculation showing the amount of Food consumed and the resulting product in lbs. of Beef.

(1.) *Concentrated Food—*

Cake 3 lbs. — 12 p. c. water } average, 13 p. c. water,
Meal 3 lbs. — 14 p. c. water } leaving 87 p. c. dry.

6 lbs. per day, or 42 lbs. per week.

100	:	87	: :	42	:	36·5
		(p. c. dry).		(lbs. natural cake and meal).		(lbs. dry cake and meal).

Dry cake and meal, . . . = 36·5 lbs.

(2.) *Roots—*

¾ cwt. = 84 lbs. per day, or 588 lbs. per week
– 89 p. c. water, leaving 11 p. c. dry.

100	:	11	: :	588	:	64·68
		(p. c. dry roots).		(roots, natural).		(total dry roots).

Dry roots (say) . . . . 64·5 lbs.

(3.) *Straw—*

1¼ st. per day = 17·5 lbs. per day, or 122·5 lbs. per week – 14 p. c. water, leaving 86 p. c. dry.

100	:	86	: :	122·5	:	105·5
		(p. c. dry).		(lbs. straw, natural).		(lbs. dry straw).

Dry straw (nearly) . . . . 105·5 lbs.

Total dry food, . 206·5 lbs.

206·5 ÷ 10 = 20·6 lbs. increase of live-weight. Live-weight brought to dead-weight at 70* p. c. = 100 : 20·6 : : 70 : 14·4 lbs. of dressed beef laid on per week.

Conclusion.—Since artificial feeding stuffs became so reduced in price, the value of the life of the well-bred animal has been proportionally increased, as will be noticed when it is realised that the price paid for the flesh of a year-old store bullock, costing 4s. 3d. per stone live-weight, is equivalent to nearly 8s. 6d. per stone, estimating it at 50 per cent. dead to live-weight.

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* Warington gives 60 p. c. as the proportion of dressed beef from a prime fat bullock's fasted live-weight, and Lawes says 50 p. c. from a store bullock if killed at the time of putting up to feed. The ordinary butchers' animal, it should be remembered, is only "moderately fat," and will not give more than 57 p. c. of dressed beef. The increase of dead-weight during the late stages of fattening may be approximately estimated at 70 p. c.

The practice of selling fat and store animals, and even at times horses, **by live-weight** has long been successfully carried on in America, and in this country it is making slow, but sure, progress. It is now made possible by the facilities which Government has offered through passing an Act which makes the erection of machines for weighing live stock compulsory in all places where tolls are charged. The scales form a ready means by which the farmer can satisfy himself of one of the most important factors in the question which he puts to himself: viz., how much money his beasts are worth. This is an extremely important point gained, as without such help the farmer with his slender experience in the market is placed at a great disadvantage by the middleman with his wide experience. No one believes that a knowledge of the weight of an animal will alone indicate its value, but that, along with a settled conviction of the quality indicated by the breed of the bullock and the state of forwardness of his condition, makes the calculation not only easy, but reasonably certain to show accurate results. The elaborate and excellent handbook of **computing tables** by Sir John Lawes* now supplies a key to the farmer in the estimations pertaining to the weight and value of his live stock. It may be roughly estimated that bullocks which are in prime fat condition will yield 60 per cent. of dressed beef from their "**fasted live-weight.**"† Three-year-old stores should give 56 per cent., two-year-olds 53 per cent. and one-year-olds 50 per cent.

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* Published by the Royal Agricultural Society, 12 Hanover Square, London.

† The expression "fasted live-weight" in America means that an animal has consumed no food for twelve hours; but the British acceptation of the term is here adopted, viz., that the fast has lasted for twenty-four hours.

When cattle are weighed at home, allowance should be made in accordance with the following data for the loss which is sure to occur while they are being taken to market. Sir John Lawes estimates the loss by fasting twenty-four hours at about 5 to 5½ per cent. of the gross live-weight=50 to 55 lbs. on an ox weighing 1000 lbs. John Swan & Sons, of Edinburgh, from their extensive experience in weighing their live cattle, estimate the loss at about 5¾ to 7 per cent. =80 lbs. from a bullock of 1400 lbs., or if come by rail a long distance in addition to fasting, the loss would amount to 100 lbs. The difference is easily accounted for by the greater rapidity at which a bullock is "emptied" when excited by travelling. The loss of original total live-weight may fairly be estimated at 5 up to about 7 per cent., according to the treatment the animal has undergone during the period of fasting.

The following table shows the relative proportions and prices of animals in various stages of development at the Edinburgh sales in the spring of 1889:

	STORE CATTLE.			FAT CATTLE.
	1 year old.	2 years old.	3 years old.	
Estimated percentage dead to fasted live-weight, ...	50	53	56	60
Price per imp. stone of fasted live-weight, ...	4s. 3d.	4s. 2½d.	4s. 1½d.	4s. 9d.
Price per imp. stone, or estimated price, dressed, . . .	8s. 6d.	7s. 11¼d.	7s. 4½d.	7s. 10d.

The figures show that at these rates the market price of the flesh of young animals is higher than the market rate of beef on an animal ready for the butcher. This is most distinctly so in the case of one-year-old cattle. The flesh of two-year-olds approaches more nearly in price to prime beef, and in the case of three-year-old store cattle, which are well forward, but not quite ready to send to market, the tendency has carried the price of rough beef below that of butchers' beef. It must be admitted that these figures and relations vary from time to time with the condition of the market, but as they stand they go to show the extent of the advantage that the breeder possesses over the feeder.

So long as the price paid by the feeder does not exceed the market rate of dressed beef he ought not to complain, as it has been shown that the production, if that be done entirely by the use of the best food materials, can be most economically accomplished during the last stages of fattening.

When the animal is young and growing it requires more exercise to keep it in health, and there is in consequence greater waste of food substance than when it is finally shut up to finish. Against this must be put the fact that the food consumed by the young and growing portion of the stock of the farm is or ought to be the least costly. Again, in comparing the two sets of figures—(*a*) the price of the estimated beef on a store animal, 8s. 6d. per stone, with (*b*) the cost, 5s. 6d., of producing one stone of beef during the last stages of fattening, it should not be forgotten that (*a*) represents the cost plus the feeder and middleman's profit, while (*b*) is simply the net cost.

Should an animal in store condition be slaughtered, the beef being unfinished will naturally bring a low price. It is therefore, as previously stated, the *life* of the animal which is valued, in the light of the prospect of what it will ultimately produce when the fattening process is completed.

The market value of life in this sense varies according to quality, as the value of beef varies for the same reason, and we find well-bred animals selling at higher prices, weight for weight, than ordinary beasts—the presumption as regards their possible performances is worth so much more to the purchaser.

The dead weight of a fat animal can be approximately estimated by **measurement.** One of the most simple and useful of the various rules employed in making the calculation is the following:—Multiply the square of the girth in feet by the length in feet, and by ·24, or ·25, or ·26, according as the animal is thought to be in moderate, in medium, or in prime condition. The answer should be the weight of the dressed carcass in imperial stones.

The great function of live stock on a farm is not the making of so much profit on so many stones of beef—as this, unless side issues and secondary advantages are estimated, is frequently absent—but (*a*) the formation of a home demand for the crude, bulky, and unmarketable farm produce, and (*b*) the making of farm-yard manure to maintain the fertility of the land.

The Author's attention has been called to a most ingenious little instrument, a "Live Stock Computer," patented by G. H. Meire, Eyton-on-Severn, Shrewsbury, which gives at sight the values of animals:—(1) by comparison; (2) at a live-weight price; and (3) at carcass price.

CHAPTER X.—DAIRYING—PASTURE AND FOOD.

Conditions, Suitable and Unsuitable—Best Dairying Localities—Cow Pasture —Water Supply—Natural and Artificial Herbage—Weeds—Extent of Dairy Land—Data for Calculating the Amount of a Cow's Food—Plan of Arrangements for Feeding 100 Cows on 300 Acres—Winter Dairying—House Feeding for a Town Milk Trade—Buttermaking without a Churn.

CONDITIONS, **suitable and unsuitable.**—The climate is the only limit to success in dairying in this country, and that on account of wet and cold on the higher of the hilly regions. All other difficulties—such as deficient rainfall and clay-soil (for example, the heavy clays near London) —that were at one time (and not so long ago) thought to be unsurmountable, can be overcome by adapting to the prevailing circumstances one of the many varied systems which are practised. There is in adopting a system of management a choice—(1) of "soiling," viz., keeping the cows entirely indoors and carrying all food, whether green or otherwise, to them; or (2) pasturing during summer; besides many combinations or variations of the two plans.

Dairying is more **remunerative** in some localities than in others, owing to the presence of favourable conditions; but the absence of some of these does not necessarily exclude the practice of dairying as a successful industry. The districts in this country of most renown in this respect are—parts of the counties of Cheshire, Derby, York, Leicester, Gloucester, Somerset; and in Scotland, Wigton, Kirkcudbright, Ayr, Renfrew, and Lanark. Such places possess the soil and the climate suitable for growing good grass, which is the best and cheapest main supply of food for dairy cows—grass being used for summer, and hay for the winter months. Roots were at one time considered indispensable, and it was thought that if roots could not be profitably grown, dairying need not be attempted ; but now that the aroma and flavour of the products are more looked to, for reasons to be explained later, they are not so popular, and the success of silage in many places too high for the growth of roots has increased the feeling against them.

Extremes of either heat or cold are disadvantageous, but these are not so great in this country, except on high cold mountain-ranges, but that they can be easily overcome by providing shelter. Summer shelter is necessary for protection against the sun and flies in warm weather, and from wind and rain while stormy, and this may be got from tall hedges, belts of plantation, high stone walls, or cheap low-roofed shelter-sheds. The winter shelter given is usually by housing, except in a few of the milder districts,—as in Cheshire, where cows lie out all winter, and where the shelters provided in summer prove valuable. Extreme cold reduces the flow of milk ; and excessive heat, with its various accompanying irritations, lowers both quality and quantity. There is no animal product of the farm so easily affected by adverse circumstances as milk. Materials for its secretion are only provided by the cow after every other want of the animal system has been supplied ; consequently, the maximum of milk production can only be attained when the cow is free from all annoyances or discomforts, so that she may settle to the consumption of a proper quantity of food, and obtain the necessary rest and quiet to make the best use of it. Moderate **exertion,** as browsing in a field, is advantageous to animals which are to be retained as dairy stock from year to year, as it keeps the limbs and the constitution generally in a sound and healthy condition, and prevents the tendency to run to fat, as cows do if tied up all the while. An immediate reduction in the quantity of milk follows any excess of exertion ; this may occur through the cows "startling," and running frantically from the gadfly (*Tabanus bovinus*), and the little grey horse fly or cleg, also from one of the *Tabanidæ* (*Hæmatopa*), which appears in July;* it occurs also when they are in season ("for bulling"), or if they are hunted in any way, or even driven a long distance to pasture, especially if not allowed to go at the slow pace natural to a cow. More food is necessary under these circumstances to make good the extra waste of the system, and all is deducted from what should have gone, under more settled conditions, to the formation of milk. The milk secreted is also inferior in quality, being poor in heat-producers, especially butter-fat (cream), and more liable to spoil in keeping or in the manufacture of its products. This is supposed to arise from the presence of an alkaloid which appears in the systems of all animals that are excited or over-heated,—as in a fit of bad temper, or after being hunted.

The amount of milk given by a cow in the morning as compared with that in the evening (twelve hours elapsing in each case after the previous milking), varies with varying conditions. When cows lie out all night, and when day and night are both mild, there is usually more milk at the evening meal than in the morning. When the nights are cold this is more marked; but should the nights be warm and comfortable, and the days too hot and the cows unsettled, there will be a greater yield of milk in the morning. In moderate weather cows feed more by day than by night, and the result of this is immediately seen in the milk production.

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* "Cattle on hot summer days are driven almost frantic by flies, thin-skinned young animals suffering more torment from their attacks than older ones. The Americans call this season of the year 'fly-time,' and as galloping madly over sun-baked pastures is not good for horses' feet, and there is nothing like peace and quiet for cows, it is best in fly-time to keep such animals in their stalls and sheds by day, and to turn them out only at night, when the horse-flies cease from troubling and the gad-flies are at rest. The plague of flies is worse in wooded districts and least in pastures near the sea, where the delicate Channel Islands cow may, in fly-time, be seen in Sussex tethered during the day."

A cow-pasture is better to be undulating than flat, provided that the banks are not so steep as to cause accident. It is a mistake to have pasture all thoroughly drained as if it were arable land, unless indeed it be arable land that is soured by stagnant water. It ought to be sufficiently dry to enable cows to walk over the surface without breaking and poaching it, but the hollows should be left moist enough to encourage the growth of food-plants and grasses different from those which occupy such land when it is thoroughly dried. These moist parts, in conjunction with the dry land, provide a variety of food, during the whole grass-season, and are particularly serviceable in a very hot summer, and at all times in autumn. Deep drains are better than open surface-drains, where the land is good enough to warrant the expense of their construction. Large open ditches, especially with steep banks, are most objectionable in cow-pastures, as there is always the danger among horned cattle of their being pushed or horned (Scotch—dunched) into them.

The water supply is of great importance, as animals yielding daily such large quantities of fluid produce require to drink deeply. The smallest inconvenience from want of water is seen immediately in the diminished flow of milk. The water must be pure as well as abundant, as with contaminations from decaying organic matter, more particularly if it be of animal origin, the milk and its products do not keep so well, and are liable to objectionable tastes and smells; moreover, outbreaks of typhoid fever have been traced to the contamination by sewage of cows' drinking water. A pure running stream, with a hard bottom and gradually sloping sides, is the best possible watering-place; but where drainage or river water is not plentiful, rain water should be safely stored in ponds or in underground tanks in times of rain against the dry season, and in such a way as to preserve its purity. A stagnant pool into which cows can walk and stand is undesirable. Their solid and liquid excreta are dropped into it, and it soon becomes filthy. Cows are fond of standing in water in hot weather, but the habit is not only injurious, inducing rheumatism if animals go into it while heated by running, but it also involves a waste of feeding time, which results in a loss of produce. Cows stand in water for the double purpose of cooling themselves and of escaping from their insect enemies.

Natural herbage from good old pasture, being a mixture of the best matured grasses and leguminous plants, yields the finest quality of dairy produce; grass forced by high manuring or by irrigation is watery and imperfect; and when that or "seeds" grass is used alone, perhaps because there are fewer varieties of plants represented in such cases, there is often a difficulty in the manipulation of the products, more especially in the case of cheese. Young grass possesses one special advantage over old pasture, in coming earlier in the season, and it is good for encouraging the flow of milk in conjunction with old pasture. There are many hill grasses and plants, on which mountain sheep live, that must not be considered inferior for dairying; as light hardy cows often do well on wild-looking pasture in upland districts, rented at from 6s. to 10s. per acre, if a wide area is given, so that the cows may have ample choice of food—say between 3 and 4 acres of pasture, and the aftermath of 2 acres of meadow cut for hay. The meadow should produce a little over 2 tons of hay, or sufficient fodder for a small cow during winter, without roots or any artificial food, till after calving-time in spring. Subsequent to this time each cow requires mixed meal and cake to the value of 20s. to 25s., to keep up the flow of milk until the grass grows sufficiently to support her.

Of weeds that give a taste and smell to milk or butter, the different species of garlic (*Allium*) are perhaps the worst and one of the most common, besides being very difficult to be got rid of. Garlic mustard (*Alliaria officinalis*), and several other varieties of wild mustard, also camomile (*Anthemis*) and ivy (*Hedera*), give a taste to milk. As several of the latter grow mostly in the shade and shelter of fences, the injury may be minimised by frequently cutting the weeds found in such places. The roots of water-hemlock or cowbane are poisonous, but they are not very accessible, and, moreover, the plant is not a common one in pasture. Buttercups (*Ranunculaceæ*) are thought by some to give a rich golden tint to butter, and by others to produce an acrid taste in milk and its products. Most probably both ideas are wrong, although the first was at one time so prevalent that the familiar name of John Buttercup was given to the dairyman. Grass-butter in May and June, the buttercup season, is naturally yellow, when cows go on good pasture, even when free from them. The change to the yellow colour is rapid at this season, forming a marked contrast to the colourless "house-butter" of winter and spring. Cows while grazing do not, if they can avoid it, eat the flower stalks and heads of ranunculus, though cases of poisoning have been traced to the consumption of acrid species. Buttercups are said to be an indication of good soil, but they appear abundantly on both good and bad pasture, and the fact is in a great measure to be accounted for by animals neglecting them as much as it is possible for them to do while browsing, through a preference for grass and other natural herbage. As a rule, the quality of land is not indicated so much by the presence or absence of weeds as by their size and habit of growth; for instance, a well-developed thistle (*Carduus*), or a large cowslip (*Primula veris*), will not grow on poor land; small and inferior specimens only, though often in great abundance, are to be seen there.

Extent of Dairy Land.—Three acres of good grass (rented at 30s. to 40s. per acre, including taxes) is sufficient to provide for the keep of each cow during both summer and winter; rather more than an acre could be cut for hay, and the remainder along with the aftermath of the hay land could be grazed.

About one-tenth of an acre of roots is often made to replace a portion of the grass area. If, however, roots are given without concentrated food in autumn, before cows go dry, more milk is produced, but the cows are thus reduced in condition and rendered more difficult to winter. There is a danger during spring of milk-fever, if roots are provided along with a full supply of hay, if the latter be of very fine quality.

The average return of a well-managed dairy of good shorthorn cross-cows should be about 550 gallons of milk under the treatment described, with the addition of some artificial food in spring. Really good Ayrshires on such land are not far behind them in milking power. The ordinary Ayrshire on poorer land should give about 450 gallons or upwards. Pedigree-shorthorns do not, as a class, even taking only milking strains, milk so heavily as their crosses and non-pedigreed, though often well-bred, relations such as are usually found in English dairies.

When the "soiling" system, and higher feeding and farming generally, are adopted, the average individual yield of milk may be raised by 150 gallons or more per cow, which will repay the extra labour should conditions necessary for such a system be present.

Data for calculating the amount of cows' food in a mixed system of summer pasturing and soiling.—As in the grazing example, 3 acres go to one cow, but the grain grown is sold, if it is not thought advisable to use it as concentrated food, which in the other case had to be bought.

Each cow requires, besides summer pasture, 2 tons of straw and hay for fodder, amounting to 25 lbs.* per day during the six winter months, besides concentrated bought food given in spring, such as cake and meal, which might cost from £1 to £2, or more if cake is continued on the grass. In addition the following roots and forage crops may be given at the various seasons throughout the year:—

(1.) One-third of a cwt. of roots per day for four winter months (eighteen weeks), given mostly when cows are dry = 2 tons 2 cwts., or 1 acre for ten cows—swedes 15-ton crop, mangels 27 tons—average 21 tons per acre.

(2.) One-half cwt. of rye per day for three weeks in April = 10 cwts. per cow in twenty days, or 1 acre for ten cows, with a 5-ton crop.

(3.) One-quarter cwt. per day of crimson clover, rape, vetches, &c., for twenty-one weeks in summer = 37 cwts., nearly, per cow, or roughly five cows to 1 acre, with a 9-ton crop.

(4.) One-half cwt. cabbages per day for ten weeks in autumn = 35 cwts. per cow, or fifteen cows per acre, with a 26¼-ton crop.

Plan by which 100 Cows can be fed on 300 acres.

100 acres of arable land farmed on a 4-course rotation.		
150	„	permanent pasture grass.
50	„	permanent grass-meadow, cut for hay.

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* Sir J. B. Lawes and Dr Gilbert in their pamphlet on "Experiments on Ensilage (1886)," Harrison & Sons, page 28, give 25 lbs. of "dry substances" of food as the daily amount necessary for an ordinary cow.

Annual Crops on the Arable Land.

(1.) 25 Acres. Wheat or Oats, followed by 20 acres winter catch-crops and 5 acres winter fallow.	(4.) 25 Acres. "Seeds" cut for hay, 20 acres latter-math pastured, and 5 acres cut for forage.
(2.) 25 Acres. Roots and forage crops following catch crops, &c.	(3.) 25 Acres. Oats, as a "nurse" for the grass "seeds."

Analysis of Root and Forage Crops, including Catch Crops.

10	acres	roots.
6⅔	„	cabbages.
10	„	rye.
20	„	vetches, clover, and rape.
46⅔	acres	Total root and forage crops.

Winter Catch Crops and Fallow after a Grain Crop.		
5	ac.	cleaning for mangels to be sown next spring.
10	ac.	trifolium and vetches.
10	„	rye.
20	ac.	Total catch crops.

Root, Green, and Forage Crops in the Regular Rotation.		
10	ac.	roots (5 ac. mangels and 5 ac. swedes).
6⅔	„	cabbages.
8⅓	„	vetches and rape.
25	ac.	Total.

The above totals make 45 acres of root and forage crops including catch crops, but 46⅔ acres are required, and can be made up by taking a second cut from 5 acres of "seeds" lands, which is an equivalent of 1⅔ acres of vetches. A second cut of "seeds" should give 3 tons per acre, or one-third of a good vetch crop.

Winter dairying, with the exception of the special object of milk supply, is little practised in this country. One of the great causes which has led to the ever-increasing importation of butter into England, is the reluctance of dairy-farmers to change their system of management in accordance with the change in the tastes and requirements of consumers. Fresh butter is now sought for not only during summer, but throughout the year, in large and uniform samples. For two conspicuous reasons the British butter makers are unable to compete with foreigners—1st, a steady supply is not to be had all the year round, because the great bulk of home-made butter is produced during the months when grass is abundant, and when it is supposed that butter can be made at a minimum cost; and 2nd, there is no means of securing those large uniform samples which alone can find a place in the great market centres. British dealers found a difficulty in securing, from the Continent, a supply sufficient to meet the vast increase in the demand for butter; and after a vain effort had been made to awaken the farmers of this country to the fact that a large extension of winter-dairying was the only means left to save them from a still keener competition, attention was turned to our Australasian colonies. So in 1891,* Andrew Clement, of Glasgow, the largest wholesale dealer in dairy produce in Scotland, was forced in the interests of the trade to pay a visit of inspection to Australia and New Zealand, with the object of stimulating trade, and of making business connections. It is only necessary to refer to the 1892 report of Wilson, the Victorian Government dairy expert, to appreciate the rate at which the fresh butter export trade is growing:—

"In 1889-90, 400 tons of butter were exported, averaging 9d. per lb.; in 1890-91, the quantity exported was 1,000 tons, averaging 10½d. per lb.; while for this season the quantity exported will be 2,143 tons, the average price being 1s. per lb."

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* In 1891, the amount of foreign dairy-produce imported was valued at over £14,000,000.

He estimates that 3,000 tons will be sent away next season (1893). The result of the development of this new industry is that British farmers are losing the slender footing they had in the butter market, and in spite of the improvement in the quality of butter brought about by the instruction in dairying provided by County Councils throughout the length and breadth of the country, the price of the home-made article is steadily declining. The farmer loses his trade connection at the end of each grass season, and he has to begin afresh in spring to establish himself against the foreigner, who keeps up a steady supply at all seasons of the year. Winter dairying, no doubt, entails more trouble, and involves the employment of a larger amount of capital, and a greater annual expenditure than the old system of summer dairying, but the annual total produce is largely increased; and if there is not much profit to be derived from that portion which is made during winter, nevertheless, by maintaining a steady supply throughout the year, a higher price can be secured for the less expensive summer-made produce.

Richard Barter, St Anns Hill, Cork, a pioneer in this system of dairying, has—

> "Found from carefully kept records that cows calving in December and January give the largest return of milk—for say ten months in milk—as there comes on a second spring of milk, when cows get the grass at the end of April and May, and they yield during the summer nearly as well as if calved in March."

Associated with the increased supply of winter produce, co-operation for manufacturing and marketing purposes is in the great majority of small holdings an absolute necessity to success. The co-operative creamery system has proved a great success in the south and west of Ireland, and at the same time an immense advantage to small holders, who individually are powerless to secure a market connection.

House Feeding as practised in the Production of Milk for a Town Milk Trade.

When good non-pedigreed milking shorthorn cows are kept at all seasons in the house, and fed to the highest degree possible, the yield per cow can be made double that obtained under the natural system described—the produce can be raised from 550 to 1,100 gallons. This system is not compatible with calving down the cows a second year. Animals at their prime, viz., after the third or fourth calf, are selected, which after milking on an average for nine months go directly to the butcher, without being put quite dry—when the yield of milk is naturally reduced, so that it would not pay to keep them longer. This is a severe drain upon the supply of our best milch cattle, and it has unquestionably, since the great increase of the milk trade in towns, tended to reduce the numbers of cattle in this country.

The cost of food per cow per day is as follows :—

		S.	D.
7¾ lbs. cake and meal, 2 lbs. treacle, } (£6. 10s. per ton),	=	0	6½
½ cwt. brewers' grains, . . .	=	0	6
⅔ cwt. roots (£1 per ton, towns' prices), .	=	0	8
10 lbs. oat straw (£2 per ton, semi-do.), .	=	0	2
Refuse straw for litter, . . .	=	0	1½
Labour, tending, and milking (3 times), .	=	0	2
Total cost per day,		2	2

In summer the turnips, straw, treacle, and part of the brewers' grains are replaced by grass from sewage meadows or by green forage—frequently rye-grass forced by dressings of nitrate of soda. The cost of this should be rather under its equivalent of winter food.

The yield per cow while in milk will average 4 gallons per day = 1,105 gallons in nine months. As each cow is replaced at the end of that time by a "green" or newly calved cow, the average of milk given annually per stall is raised to 1,460 galls. The reduction in value of the cow may be estimated at £6 or £8 between the "laid in" and selling price, a sum now too large to be balanced by the value of the manure.

Buttermaking without a Churn.

A remarkable characteristic appeared about seven years ago in a cross-bred cow, the property of William Lind, Belford. The cow, now (1892) eleven years old, was got by a pure-bred shorthorn bull, it is believed, though of the breed of the dam there is no absolute certainty, out of an Ayrshire cow. During the first two years that the old cow was in profit there was nothing unusual about the quality of the milk, but after the birth of her third calf she produced milk of special richness, the cream of which was readily made into butter by stirring with a thirel-stick for a space of time not exceeding five minutes. For the past seven years no churn has been used, and in warm weather the cream sometimes forms butter without stirring.*

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* The Author had a sample of the milk sent to Edinburgh for microscopical examination in 1890, but nothing unusual was discovered except that the fat globules were found to be remarkably large. The total return of produce sold in that year, the last in which a record was kept, amounted to £39. 10s., made up of £33 received for new milk sold at 1s. per gallon, and £6. 10s. for butter of excellent texture and flavour at 1s. per lb. When the animal was at full profit the yield amounted to 28 quarts of milk in the day. The heifer calves of this cow, three in number, by shorthorn bulls, have been reared, and two of these have inherited their mother's peculiarity. Had this remarkable animal been born in America she would most probably have been selected as the founder of a new and unique breed of dairy cattle, not merely on account of the peculiarity exhibited in the cream, but also owing to the excellence and abundance of the produce.

CHAPTER XI. — DAIRYING — COWS AND THEIR MANAGEMENT.

Treatment of Dairy Cows—Milking—Milking Machines—Period of Lactation—Guénon's Escutcheon Theory—De-sexed Cows—How to put a Cow Dry—Three Points with regard to Purchased Food—Effects of Common Food Stuffs—Hoven—Good Permanent Grasses as Food—Breeding and Calving for the First Time—Signs of Pregnancy—Of Parturition—Calving—Protracted Labour—Premature Labour—Means of Preventing Abortion—Straining—Cow Breeches—Protrusion of the Vagina—Milk Fever—Trembling or Loupin' Ill—Weed—Inflammation of the Udder—Choking—Lameness.

TREATMENT **of Dairy Cows.**—It is of the utmost importance to have the cows, the byres, and everything connected with them, kept scrupulously clean, not only because the produce is so easily injured by the presence of any impurity or odour, but on account of the necessity for perfect health and comfort in the animals to attain the maximum of production. Sufficient and well-regulated ventilation maintains the temperature at a few degrees below 60° F., and prevents cows losing their hair and becoming too bare and susceptible to cold when turned out for water in winter or to grass in spring; it also keeps the atmosphere pure and sweet. This may be aided by swilling the gutter daily with water, where means admit of the practice. Regular grooming during winter is necessary with cows, as with all animals that are tied up, and are thus prevented from rubbing or licking their skins, or being licked by others on itchy parts. General comfort is synonymous with more produce or better condition, with a given amount of food. March and April is the usual calving time for cheese- or butter-making summer dairies, so as to have cows coming to their "flow" within two months on getting a full supply of grass—May, June, and July are the three best months for abundance. Heifers calve, usually, a month later. Pedigreed cows being more or less precarious breeders, are permitted to calve at any time; but the best period is soon after the New Year, to give the young ones as much time as possible to grow before the grass comes, and to secure at the same time an advantageous position by being early in the regulation herd-book-year. Where milk is sold, more cows than in the case of other systems are "calved-down" in autumn, to provide for the winter demand, owing to the necessity of maintaining as far as possible a uniform supply. Cows go to pasture for good either before or after 1st May, according to the climate, having been gradually prepared by a short daily run over young grass, which is usually early. The amounts and varieties of forage crops sometimes given while cows are being milked have already been stated. Three or four pounds of cake, supplied to each animal daily while on pasture, no doubt increase the amount of produce; but unless in special cases, where the pasture is insufficient or needs manure, it is a question if the practice pays when dairy produce is at ordinary prices, because cows thus treated are more difficult to support in winter, and they also show the approach of old age more rapidly.

Milking is usually done twice a day, in the house if possible, as cattle are there more at rest in the shade and free from flies; moreover, milk is kept cleaner, especially in wet weather, when rain would wash impurities into the pail from the skin. All dirt adhering to the udder (more usual in winter than in summer) should be wiped or, if necessary, sponged off to prevent taint in the milk. The only sufficient excuse for open-air milking is when cows pasture at a great distance from the farm buildings; and, again, if cows are milked in a very close warm byre, they run the risk of being chilled when turned out at night in autumn.

It is sometimes necessary to milk three times a day when the vessel is hard and swelled as it frequently is soon after calving ; when there is an excessive secretion and milk running from the teats ; or when warm mid-day milk is wanted in a local trade. More milk can thus be got on the whole, but the additional expense debars the practice, unless when the cow's comfort or the circumstances of trade urgently demand it.

Cows are kept in the house over night when autumn frosts and cold or stormy weather come on, to prevent the quantity of milk falling off rapidly, except in those districts where cows are wintered out of doors, with the result that they quickly go dry and cease to give milk. For the first few nights of indoor life the yield is less, but it increases as the animals become accustomed to the change, and remains pretty constant for a few weeks.

During winter they are let out only once daily, or, what is better, twice if their fodder has been salted, to drink water and to lick their skins. When the ground is frost-bound and slippery, water should be carried to them. A walk of a quarter of a mile to the water before drinking, and the same in returning, prevents shivering, which frequently occurs when cold water is given in the house. The exercise also keeps the limbs in good condition, and helps to maintain the constitution of the cow in a healthy state.

Cows acquire the habit, especially if going on the same pasture from day to day, of finding the way towards the milking-place generally at the right times. The hours for milking should be regularly kept, and should divide the twenty-four hours into two equal parts. Each cow knows her stall in the byre, and if not disturbed will usually go directly to it, unless she be tempted at times to steal food from a neighbour's allowance by the way.

If cows are constantly milked by one person for a length of time, they often "keep up their milk," or "do not let it down," should another milker be introduced. It is a usual rule in dairies to change the milkers regularly to avoid this chance of loss. This custom has other advantages: it apportions each milker a fair share of "stiff" or difficult cows, as well as of those easy to milk, and prevents an inferior milker "putting the milk off," or "drying" certain cows, by bad milking carried on continuously.

Milking should be performed as quietly, quickly, and thoroughly as possible. If all these requisite conditions are not attended to, the quantity of milk soon falls off. One of the greatest difficulties of the dairy farmer is to find good milkers. A cow must not be struck or excited in any way; as, in addition to the small quantity of milk given, the quality is so injured at times, that it has been known to affect the milk of a whole dairy when mixed with it.

A calf takes about three or four minutes to suck a cow dry. Milking by hand should come as near this as possible. A good man (or a woman in Scotland) milking ten cows (a usual and ample number) will finish the work in an hour if it is done by contract, except for a week or two at the height of the grass season when the full flow of milk is on. When milking is done in the ordinary way, with no special inducement for haste, nearly two hours are taken up. An hour and a half may be stated as a good average time for a full milking.

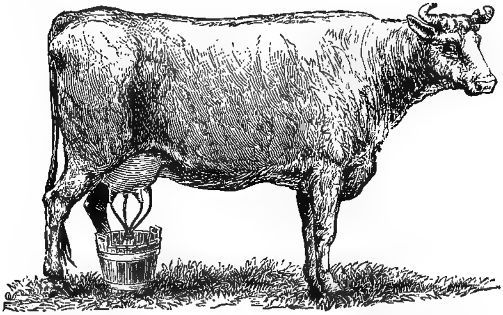
A milker should sit on a stool close to the animal, and hold firmly between the knees a "handy" or pail, large enough to contain all the milk, thus doing away with the necessity of rising to empty a portion of it into the receiving or carrying can before the operation is finished. The arm next the cow's hind leg should be placed close to it, to be ready to press back should she attempt to kick. To ensure safety from kicking some nervous milkers tie the hind legs together at the houghs. If this were always done without pain to the animal, there would be no objection to the practice; but there is the risk of careless milkers doing it roughly, and thereby irritating and chafing the skin. It is better to "dry milk" or handle young cows for some weeks before calving to break them in, and by gentle treatment coax them to stand quietly. Special care is necessary immediately after calving, while the udder is hard and painful. Sometimes a nervous or wicked cow, or one with sore teats from cow-pox, raw from the attacks of flies, hacking from exposure to cold east winds or chilly nights in summer with heavy dews, will stand in no other way than with a man holding her head with a finger and thumb in her nostrils. After a time, in many cases, the presence of a person near the shoulder is sufficient, without holding, showing that if care had been bestowed at first this unnecessary expense and trouble might have been avoided. Sometimes an intractable cow is secured by "bulldogs" or "humbugs" put in the nostrils, and by a rope attached tied to the railing in front.

There is no "right" and "wrong" side of a cow on which to milk. In double-stalled byres the milker places himself between two cows, milks one from the right side, and then turns round and takes the other on the left. It is well to train a cow, especially a show animal, so that she can be milked from either side, as this tends to keep the udder more evenly balanced. When this is not attended to, as in an ordinary dairy of common cows, it usually grows heavier on, and hangs to, the milking side. The near-hind and far-fore, and far-hind and near-fore teats, should be milked together alternately.

Cows with very small teats, especially when swelled after calving, are very difficult to milk, and tiring for the hands of the milker, as only the forefinger and thumb can be used.

Others are "stiff" to milk, from the passages of the teats being small. These can be widened by inserting a form of bistoury, which opens like a glove-stretcher. The cutting surface is on the outside of the thinner of the blades, and after inserting the closed instrument well up into the passage of the teat, the incision is made by opening and suddenly withdrawing it. When this operation is overdone, milk flows without the action of milking, and loss results. A safer method of improvement, in ordinary hands, is that of using a small cone of metal or wood (in preference to ivory, sometimes recommended), which is left in the canal of the teat to distend it between milking times. The cutting instrument is sometimes used, but not often successfully, when a cord forms at the neck of the teat, through the contraction or growing up of the milk diaphragm, usually the result of suppuration. Sore teats should be well greased, before and after milking, with vaseline. If the skin of a teat is very tender, the milk may be withdrawn for a few days by a silver milking-tube or syphon, while the sound teats are being milked. A piece of red yarn or tape ought to be tied to the tube to prevent its being lost if dropped among the litter.

BISTOURY.



The Jersey Creamer Co.'s Self-Acting Cow-Milker.—Price 6*s.* 6*d.*

Milking Machines are, as a whole, more or less unsatisfactory, as the sucking and boxing action of the calf, which encourages milk-secretion, has not yet been perfectly imitated. There are many varieties, but in the mechanism of the most successful of them one or other of two principles is usually adopted. In the case of the first, which is the least costly and complicated, the milk flows by gravitation through perforated syphons inserted into the teats. The self-acting cow-milker affords immense relief to an animal suffering from galled teats or a swollen udder, and ought to be more extensively used in this connection.

In the second class of milker referred to, suction is adopted, in imitation of the natural action of the calf, through the creation of a vacuum by means of an exhaust pump or a descending column of water in a close pipe. The most promising of those before the public in this country leave little room to doubt that a brief space of time will lead to the development of a serviceable machine, which will be all the more appreciated by the farming community as labour difficulties become more intense. The leading defect at present is that the teats become dark and swollen, owing to the interference with the circulation of the blood, especially in autumn, when the milk does not flow so freely as in summer.

The usual period of lactation is between nine and ten months, giving the cow a rest of two or three months to prepare for the next milking period. Cows naturally take this time, more or less; but they are to a considerable extent affected by the kinds and quantities of food given, and by the general treatment. Some continue to yield milk till the next calving, but they do not produce so abundantly the following year.

M. Guenon's "Escutcheon" or "Milk-Mirror" theory* holds that the extent of surface of the udder and thighs that is covered with hairs turning up and out, in place of down like the rest of the body, is an indication of the amount of milk the cow will give. If the surface covered by the reversed hair is large and broad above the udder, extending far on to the thighs, the cow should be a good milker; and if it be broad and smooth up near to the setting on of the tail, the flow should last well out at the end of the season. Great attention is paid to the escutcheon theory in America and in France, where it has been studied for over sixty years, but it is little regarded in England. The explanation seems a very doubtful one, viz., that the arteries supplying the udder terminate in the skin, in the region covered by the escutcheon, and turn up the hairs. If there is a large area thus marked, it is supposed to indicate that there are many terminations, and consequently large arteries, devoted to the supply of milk-producing blood to the udder. The size of the milk-vein, carrying away the refuse of the blood which passes through the udder in the process of milk secretion, is a much more reliable indication of the "depth" of a cow's milking capacity.

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* The system was instituted by Mons. Francois Guénon, of Lisbourne, the son of a poor gardener, and a great student of Nature as represented in the

Robertson, the Canadian dairy-expert, enumerates as follows the leading **points by which to judge a cow**:—

"(1.) A long udder lengthwise of her body, and very elastic; the

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vegetable and animal kingdoms. As far back as 1814, while tending the household cows, he believed he could trace a relationship between the yield of milk and the form of the "gravure" or escutcheon. After making further inquiries, which tended to strengthen his belief, he began business as a cattle-dealer in 1822, and dealt in cows of different nationalities. The result of his long and careful observations led him to classify animals in three groups according to size—large, middle, and small: the signs he divided into eight classes, and each of these classes into eight orders. From an intimate knowledge of their variations, he could indicate the quantity and quality of milk a cow would give daily, and the length of time she would continue to give a good yield. In 1837 he stated his results before the Bordeaux Agricultural Committee, and in 1838 to the Agricultural Society of Aurillac. His views were accepted after test trials of the system, and by the few who have undertaken the great labour of mastering the details it is pronounced to be an excellent guide in the selection of cows possessed of good dairying qualities.

elastic quality means room to make milk. (2.) A soft skin—a mellow skin, covered with mossy, silky hair; the skin, if coarse or harsh, means sluggish digestion inside, and that means an expensive cow that does not digest her food or thrive well. (3.) A cow should have a large roomy barrel, with broad ribs wide apart, for holding plenty of good, rough, bulky, cheap feed; it should be filled twice a day. (4.) The milk-veins under the cow's belly should be prominent; prominence is a far more important indication than actual size would be. (5.) Firm muscles in the abdomen mean good constitution; they are the best evidence of endurance and thrift that can be found in a cow, and endurance to stand the strain of giving milk continuously is what is wanted. (6.) A cow should have broad loins with long rumps, a rather long lean neck, with clean-cut face and prominent eyes."

De-sexed or "spayed" cows will milk constantly for years, and give, on the aggregate, a larger yield than cows which calve annually in the usual way. They are specially suited to outlying districts in the colonies, where there is grass all the year round, and where settlers' single cows are many miles from a bull. The milk resembles that of farrow cows, being richer than when cows have been some months pregnant; but the great gain is in the conservation of the food and energy necessary to produce a calf.

The best method employed in putting a cow dry, to avoid the risk of losing a quarter through suppuration, is to stop milking, smear the udder with tar (*see* page 151), and reduce the quantity of food. Milking once a day, every second day, or after a few days, when the vessel swells up, is now found to be a mistake. The action of milking encourages the secretion of milk which would otherwise never form, and only retards the drying process. Bleeding from the jugular vein on either side of the neck is at times adopted, and a dose of 16 oz. of Epsom salts is not infrequently administered. This is the only time that salts may be given to a cow in milk, as they most effectually reduce the flow, and to a great degree permanently for the season. These extreme measures are most applicable to cows giving a considerable quantity of milk, or that have been put to grass. Inferior fodder should be used up when cows are "out of profit" or "resting" from the duties of milk-production. If the fodder be very bad, a few roots require to be given in addition, or it might be necessary to sprinkle it with treacle-water from a rose-can if the taste and smell are not so attractive as they ought to be.

There are three points with regard to which a farmer should satisfy himself before choosing food stuffs:—*1st*, That the price, according to feeding value of the food which he selects, is as moderate as that of any equivalent material he could find in the market. This rule is too often neglected by the farmer, and accounts for the prices of certain well-known feeding-stuffs being at times far above their real feeding values. Farmers in this country are slow to learn and loth to make changes, especially in matters where scientific advice should be called in to determine the quality of a new material, and they consequently suffer from the results of this state of inactivity when they come into competition with the much more progressive foreigners.

2nd, He should employ those foods that do not produce a disagreeable taste in milk or butter—such as cabbages, mangels, and the more common meals and cakes—and avoid as far as possible the use of turnips. Swedes are not quite so objectionable as common turnips, which when given to cows induce a disagreeable taste and smell in their milk and its products. The proper time to use turnips in dairy management is when the cows are dry, or in a case of necessity, as when other descriptions of succulent food are not available, in small quantity immediately after milking, being it is thought at that time less injurious. It is asserted that cutting off the crown of the bulb close to the base of the leaves is a preventive of the worst results. Palm-nut cake or meal, unless given in small quantities, flavours milk, but not very objectionably.

3rd, He should use the proper foods to suit the condition under which an animal is placed; for example, cotton-cake given in quantity to cows in calf will at times cause the death of most of the calves when they are about ten days old. Three pounds per day may be given with safety—undecorticated cake, if the animals are on grass, as it possesses astringent properties, and counteracts the tendency to excessive looseness of the bowels. Decorticated cake, ground into a fine state of division on account of its being hard to chew if in lumps, is better given in winter, or, if in summer, on the pasture, mixed with maize-meal.

Effects of a few common Food Stuffs.—Bean-meal, perhaps to a greater degree than anything else, increases the flow of really good milk.* Meals of leguminous seeds, when consumed by animals in large quantity, have a binding or costive tendency, being deficient in oil. Bran counteracts this tendency, and is itself excellent for encouraging milk-production. Treacle is now increasingly used to fulfil the function of bran. Brewers' grains, costing 4d. to 5d. per bushel (a full allowance for one day), are also "opening" or loosening to the bowels, and greatly increase the flow of milk, but its quality is very poor unless the animal is otherwise liberally fed. When used freely, grains injure the breeding powers of cows, and are in consequence of most service in town dairies, where the fattening-off process is associated with milk-production. A small quantity of malt dust in a mixture gives it relish, and as a food it is also a good milk producer. Clover, green and wet, unless in small quantity, is a most dangerous food to give to cattle not accustomed to eat it, as it produces hoven, especially in the case of cows which are ravenous feeders. Clover should consequently be given dry, and be begun gradually.

Hoven is the disorder which is induced on the suspension or retardation of the function of digestion. It may be acute, due to some sudden ailment, and dangerous to life; or chronic, the result of a derangement of long standing. In the acute form digestion stops, and gases are evolved in the process of fermentation which sets up in the food contained in the stomach of the animal, more especially if the food be of a green and succulent nature. Pressure is thus brought to bear upon the diaphragm, which is unable to act, and ultimately the animal, if not relieved, dies of suffocation.

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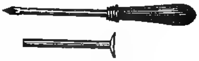
* Bean-meal has also been given with satisfactory results, when, for som unknown cause, the curd would not adhere in the cheese-press.

Treatment.—In the case of eild cattle, 1 oz. of turpentine soaked into dry meal, and administered in cold gruel or cold water, may overcome the disorder if given in good time. As turpentine permeates the whole system and flavours the milk, cows "in profit" should be drenched with 2 quarts of hot beer, or a pint or more of whisky made into hot "toddy." In a case of urgency, instant relief is secured by puncturing the rumen with a trochar and canula, at a point on the left side equally distant from the anterior spine of the ilium, the transverse processes of the lumbar vertebræ, and the last rib. The canula is left in the wound for a little to form a free vent for the escape of gas. On its withdrawal, the wound in the stomach contracts on account of the opening having been made when that organ was greatly distended. A clean pocket-knife may be used for the operation in a case of extremity; but as there is nothing left on its removal to preserve the channel, a portion of the food blown from the stomach by the force of the escaping gas is liable to lodge under the skin, and in course of time to produce a suppurating sore. The chronic form of the ailment should be treated by the administration of repeated doses of salts with 2 oz. of a mixture of ground gentian and ginger, or of treacle along with ½ oz. of carbonate of ammonia or turpentine* as tonics.



TROCHAR AND CANULA.

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* Turpentine should not be used too frequently. *See* page 289 for the results of turpentine poisoning.

A mixture of good permanent grasses and other plants, grown on soil naturally fertile, but in a state of Nature, is by far the best food for making the most perfect dairy products. Grass or forage crops from highly manured land or irrigation meadows, although they may increase the quantity, diminish the quality of milk, and more particularly its products, and make it often much more difficult to manipulate in manufacture. The remark relating to quality also applies to cakes and most other foods given to cows while on the grass. If there is not an objectionable taste or smell, the natural conditions are changed in some other way,—a change which would be observed, for example, in the altered texture, in the keeping power of the butter, or in a greasy condition of the cheese.

Breeding, and Calving for the first time.—The ordinary dairy farmer should not buy but breed his own stock if possible, paying the greatest attention to selecting the calves of the best milkers to rear for bulls and heifers. When this is done there is less risk from imported disease; and as a farmer is able to breed better cattle than he can buy, he can with care produce animals of better quality than are to be found in the market. The milking powers of a herd may be vastly improved within a few years by this means. To fill up the places of cast cows,—those that have become old, or have proved unlucky or unsuitable,—young heifers, to the number of between one-fourth and one-third of the total of the dairy, should be available each year. Whether it is a good practice to "calve-down" heifers at a little over two years, or a little over three years old, is mainly a question of feeding. If cattle are kept in thin condition, as the ordinary Ayrshire is in its native county, the best results are obtained by calving at "three-years-off." At two years an animal, if poor, is too small, will not milk satisfactorily the first season, and is very likely to "miss the bull" and remain farrow during the second. If heifers are well fed, and made to calve at two years off, as in the case of Channel Islands cows and well-bred milking shorthorns, then the natural development and growth, which continue even for years afterwards, are led into the lines of milk production; and the organs which are then most active are not allowed to become atrophied from want of use, or gorged with fat in the attempt of Nature to rid the circulatory system of a superabundance of fatty material. Nature indicates the proper course to be followed by well-fed animals if not over-fat coming in season sooner and more regularly than those in poor condition. Very fat cows are most uncertain breeders, and when this difficulty is overcome they usually produce small calves.

The usual period of gestation is, in round numbers, nine *calendar* months. Lord Spencer's table (*vide R.A.S.E. Journal*, 1838) establishes the average period for healthy cows at 280 days.

Signs of Pregnancy.—1. A cow does not come in season when pregnant, otherwise she should do so at intervals of about three weeks.* The exceptions to this rule are, that extremely poor, or, on the other hand, very fat "eild" cattle may not come "a-bulling" so often, while some few continue to bull although they are in calf. This latter peculiarity has been noticed during the early stages of tuberculosis, the disease affecting the organs of reproduction.

2. The right side of the belly becomes enlarged, and after a time the calf, in the form of a hard lump, can be felt with the hand near the flank, and seen to "jump" or "quick" at times, especially when the cow drinks cold water.

Signs of approaching Parturition.—1. Enlargement and firmness of the udder and teats.

2. Fluid may be drawn from the teats of a more milk-

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* In summer œstrum returns about the nineteenth day; in winter its recurrence is slower by twenty-four or even forty-eight hours.

like character and less watery than that found in the teats of "eild" cows.

3. Loosening and enlargement of the hinder parts, as the external portions of the organs of generation, and relaxation of the pelvic ligaments. Large heavy cows find it difficult at this time to rise or walk about. These three indications frequently last for days.

4. Within a short time of calving, which may extend to a few hours, a cow becomes restless, lies down and rises frequently, and whisks her tail, as if in pain.

5. The right side becomes flatter when the calf passes into the pelvic bones as labour begins.

Calving.—It is wrong to assist a cow too soon, and it is equally bad to leave her in difficult labour until she is worn out and the pains become weak. The head and legs of the young within the mother are doubled up, and it assumes the form of a ball enclosed within a bag called the "amnion," "clean," "fœtal-membrane," or "after-birth." The bag contains a slimy fluid, in which the calf floats, and which lubricates the passage when the membrane is broken. When assistance is given, the hand and arm should be well rubbed with carbolic oil before being inserted. The right position for the calf is with its head and fore-legs "forward," in the position of a man diving, the head and neck being stretched out so that they rest upon the limbs. When the hind legs appear first, there is frequently considerable difficulty in giving birth to the calf, but it is not so necessary to turn the calf before pulling as in the case of many other false presentations.

The cow should lie on her side during the operation (although in some districts she is made to stand in the fashion portrayed in the tomb-paintings of ancient Egypt), and the pulling, which is done by the fore-legs, should not be straight, but inclining slightly towards the houghs of the cow, one man distending and freeing the os vagina with his hands. A cow should, as a rule, be made to rise immediately after calving to prevent after-straining. If the animal is exhausted, and there are no symptoms of straining, she may be overlooked and allowed to rest for a few minutes. She should have a small drink (say 1 gallon) of cold water with a little oatmeal thrown into it, and this may be repeated every few hours until thirst is quenched. It is an unnecessary precaution and a mistake to warm the water, as a cow often will not drink it. All that is necessary in this connection is to beware of giving too much at a time to chill her.

In protracted labour stimulants are necessary, as one pint bottle of whisky, a quart bottle or more of beer, or half-an-ounce of carbonate of ammonia. A mouthful of cold water is also beneficial.

Common Causes of Protracted Labour.—1. False presentations.

2. Death or deformity of the calf, at times necessitating the cutting up and removal of it in pieces. Sometimes it becomes mummified, and remains in the animal for years: the cow coming "a-bulling," but being unable to breed. At other times it rots, and comes away from time to time in small pieces or as putrid matter. In such a case the animal is liable to get into a very lean condition and poor state of health, and may even die of blood-poisoning.

3. Disease, or abnormality of any of the internal reproductive organs.

The "cleansing" hangs for a time after the calf is born, but should drop within a few hours. *Treatment*—Give opening food stuffs, as linseed (made into tea), bran-mashes, and treacle.

Abortion.—When a cow calves before her time she is said to "cast," "slip," or "pick" calf. The calf is usually dead, but it may be alive and continue to live if so early even as the seventh month. In any case, the loss to the owner is great, as there is usually no adequate preparation by the cow for milking.

Causes of Premature Labour.—1. Eating ergotised grass in autumn.

2. Injury, as from horning by other cattle, hunting by dogs, crushing through narrow doorways, shaking and bruising on a railway journey, &c.

3. Walking through a dung heap, or over boggy or soft land, and getting strained.

4. Very cold or foul water, or too many frosted turnips, especially if given in the house while the animal is not moving freely about.

5. Superpurgation, either natural or induced by physic.

6. Any contagious febrile disease of a serious character; for example, infection arising from association with newly aborted cows which are affected with contagious abortion, or from bad animal smells.

The last is perhaps more common and dangerous than all the others put together, because its work is done unseen, and it often cannot be easily avoided even when its presence is detected.

Indications of approaching labour are usually seen for some days, or even a week or two, before the crisis comes. A cow should be removed from amongst the others whenever these are noticed. By taking the temperature the attendant on the outlook for signs of premature labour may receive warning of the approaching danger before any external evidences appear. The normal temperature of a cow in a byre is not over 102° F., even when kept too warm and without proper ventilation, but it goes higher as abortion approaches if the affection is of a contagious nature. Quiet, and proper dieting, may sometimes avert an impending attack, if the calf be not dead.

In cases of abortion the after-birth usually adheres firmly to the button-like connections (cotyledons) with the uterus, and part of it often remains rotting for weeks. The cow then falls off in condition, and if she is not attended to there is danger of absorption of the fœtid matter into the circulation, blood-poisoning, and death. Should the opening-food-treatment not succeed in two or three days, the bulk of the membrane left is sometimes removed by the hand, which should be well smeared with carbolic oil before being introduced to sever the connections. Tepid water, containing 1 per cent. of pure carbolic acid, should be injected to wash out the uterus and vagina twice a day. The operation necessary for the removal of the effete body is not to be recommended at any time, but it is most dangerous if rapid decay of the "cleansing" is going on, and putrid matter is present. The points of attachment to the uterus are left more or less in the condition of open sores, by which poison may enter the blood. Cows which have been thus treated do not readily conceive in the following season.

Means of Preventing Abortion.—1. Cut over the seed stems of such grasses in the pasture as are liable to the attacks of ergot.

2. Prevent cows from being frightened or injured in any way.

3. Whitewash the inside walls of byres twice each year with newly slaked lime, and disinfect frequently with carbolic acid, chloride of lime, or hot flour of lime.

4. Remove all decaying animal matter that is within reach of the cows.

5. Have the floors of the stalls as nearly level as possible.

6. Remove at once from among the cows any animals that have aborted, and those that threaten to do so.

7. Get rid of all such unlucky specimens before another calving season comes round.

Professor W. O. Williams, writing on the Prevention of Epizootic Abortion, says:—

"Professor Nocard, of the Alfort Veterinary School, who has made the study of epizootic abortion in cattle a speciality, formulates the following measures for its prevention :—

"*a.* Every week the cow-shed floor should be thoroughly cleansed (if unpaved, the soil should be scraped), and sprinkled with a solution of sulphate of copper (10 drachms to 1¾ pints of water).

"*b.* The individual treatment of the cows is more complex, and should consist of—

"1. Vigorous vaginal injections of the following fluid (with a horse enema syringe), which ought to be tepid :—

Distilled or Rain Water, . .	35 pints.
Glycerin, ...	of each ʒ iss.
Alcohol at 36° . . .	
Bichloride of Mercury, . . .	grs. 75.

Dissolve the mercury in the alcohol and glycerin, mix them thoroughly with the water, and keep the fluid in a wooden vessel away from animals and children.

"2. Every morning, when cleaning the cows, with a sponge dipped in the fluid, carefully dress the vulva, anus, and anterior surface of the tail of all of them.

"3. When a cow aborts, she should be delivered at once by hand, and the fœtus and its envelopes immersed in boiling water, or destroyed by fire.

"The uterine cavity should then be irrigated with 12 to 15 pints of the above fluid, by means of a long piece of india-rubber tubing passed into the organ by the hand.

"The intravaginal or intra-uterine injection always causes, especially in young cows, apparently violent expulsive efforts, but these in reality do no harm. As to the cows in which the contagium has already reached the interior of the uterus, nothing can be done. The treatment does not produce any good effects until the second year. In the first year there are always some abortions, though they are less numerous.

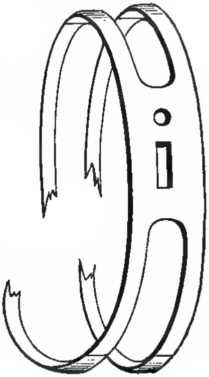
"Nocard has obtained the best results from the employment of this method, and he is of opinion that a single vaginal injection, given at the commencement of the treatment, will establish asepsis, but only when the daily sponging of the vulva, anus, and tail is strictly carried out."

Though Professor Nocard has undoubtedly earned the credit of having carried this important investigation further than any one else, yet we must not consider the matter finally settled. The time has now arrived when a series of exhaustive experiments, conducted under the direction of veterinary experts of Her Majesty's Government, or of one of the leading Agricultural Societies, should be instituted.

"**Pressing,**" "**straining,**" **or** "**after-pains,**" producing inversion of the uterus, are very frequent after difficult parturition, being caused by injury to or irritation of the parts involved. The injection of laudanum and carbolic oil—carbolic 1 to 20 of oil—if done early, suffices to allay it. Carbolic oil, used alone in the first tried proportion of 1 to 7, has been known to increase the irritation where a scratch existed, and to drive the cow almost frantic.

When the displacement of the uterus is noticed before it protrudes to any great extent, it may be easily replaced by closing the hand (to prevent injury by the finger-tips) and pressing it back gently but firmly. If necessary, the uterus may be washed previous to replacement, tepid water being used on account of its producing less pain than a cold application. The hand is not withdrawn until the normal position of the uterus has been secured. The most effectual way to prevent its reappearing externally, is to stitch across from hip to hip with clean white tape or wire drawn through three holes made by a pen-knife in the skin on each side, the tape passing over the lips of the vulva to give support. The treatment appears cruel, but is the only effectual means in serious cases. The dangerous remedy, amputation, is the only one open when the ailment is allowed to go very far. To ensure safety, before any symptoms of pressing appear, and also in mild cases after it has begun, cow-breeches are of great service, but they are of little value when the pressure is intense, as they cannot be put on sufficiently tight to resist the effects of severe straining.

Cow-breeches are made of strong leather, in the form illustrated in the accompanying figure, the four ends being fitted with strong canvas terminations which are not here shown. They are put on to prevent the sudden expulsion of the womb after calving, and openings are made in the leather for the escape of the solid and liquid excrement. The tail of the cow rests in the bifurcation of the two upper ends; these cross over the back, and are carried forward and tied to a strong band or girth fastened tightly round the body in the region of the heart, while the other ends, conducted past the udder (one on each side), cross on the belly and are similarly fastened below.


Cow-Breeches.

Protrusion of the Vagina (or the "body" in common language) occurs both before and after calving, when some animals that are in high condition and well fed lie down. The proper treatment is to bathe the protruding organs to clean them, and wash with a solution of chloride of zinc to stimulate the relaxed parts and to prevent the development of objectionable odours. The floor of the stall should be a little higher at the hind than at the fore feet of the animal, and the food given should be concentrated rather than bulky.

Milk-Fever or Parturient Apoplexy occurs not so much in fat cows, as is usually supposed, as among cows that are being well fed, and are full-blooded and thriving rapidly at the time. Many fat cows are in this condition, but very many that die of milk-fever cannot be said to be fat. Deep milkers are more liable to it than others, but only in the case of cows of more than one calf. It usually appears within three days after calving, but sometimes, though rarely, before it. Digestion is suspended, there is high fever, with pressure of blood on the brain, and consequent loss of power.

Treatment.—In severe cases there is little chance of recovery unless bleeding is early resorted to. Eight lbs. of warm treacle and a teaspoonful of saltpetre (nitrate of potash) should be given as soon as practicable. This drench acts more quickly than Epsom salts, and is more suitable for a cow in milk. Stimulants (a pint of whisky, or if not at hand an equivalent in strength of beer) are indispensable; turning three or four times a day should be practised; together with friction, ironing, or a mild blister (mustard or turpentine) applied to the back, and cold water to the head; and the milk should be very frequently drawn. The application of white of egg rubbed on the back is a favourite remedy with some. Milk-fever is sometimes induced by giving cows their own milk to drink at first, when it is of little value, especially if the milk is not mixed with an equal amount of water. With cows in poor or weak condition, however, this is a good and safe practice.

An attempt at prevention is better than remedial treatment, though at times all precautions fail, and it is difficult to see why. It is advisable to restrict the amount of food for some time before calving, as by shutting up at night without a supply of food, and to keep the bowels open by bran or grass. Green food supplied in moderation is less to be feared than that which is hard, woody, and less easily digested, such as rye-grass hay which perhaps has been over-ripe when cut. If the udder is large and painful, milking should be done regularly, even ten days before calving. Should these preventive measures not prove sufficient, as would be shown by one cow of a number similarly treated becoming affected, the animals most likely to become ill may be bled and physicked a day or two before the calf is expected, or merely physicked with treacle or 14 to 16 oz. of Epsom salts followed in fourteen or fifteen hours by a pint of linseed oil to counteract the secondary costive tendency of the salts. This may be repeated. All the foregoing treatment is directed to the reducing of the plethoric condition of the blood, and the keeping of the digestive system in good order, without at the same time doing anything to permanently reduce the natural flow of milk after calving.

The most acute symptoms of trembling or loupin' ill in cows are much like those of milk-fever, though the cause is quite different. The disease, which is local and infrequent among cattle, is described under sheep at page 292.

Weed.—Lean cows often go down and are unable to rise within a few days after calving, if exposed to cold, especially to draughts, and are as helpless as regards ability to rise as those suffering from milk-fever. The great difference as compared with milk-fever is, that there is no fever and no pressure of blood on the brain, and the animal often eats and drinks normally, and will even milk heavily for a time. The method of nursing is the same, only part of the treatment is varied to suit the difference of conditions—bleeding, or the application of cold water to the head, for example, being unnecessary. Weed may be altogether prevented by keeping a cow in warm and comfortable quarters after calving, and by covering the back with a sheet for a few days.

Inflammations of the Udder.—*1st*, *Udder-Clap* is an affection which attacks cows that have given milk, but are at the time yeld or dry. Heifers with fleshy udders, but which have never bred, have been known, but rarely, to take it. It is thought to be induced by the "striking" of a fly, and that the irritation thus produced sets up inflammation, which is followed by suppuration. It appears usually in or after hot weather in August, one-quarter of the vessel swelling and becoming painful. If not promptly treated two or more quarters may become affected, high fever may be set up, and a hind limb may become involved. At times the enlargement extends along the belly and down the fore-legs. Death is sometimes the result in acute cases; and when this is averted, at least the loss of one-quarter of the udder, and from one-third to one-half of the value of the animal.

The Remedial Treatment is to give a dose of salts, rub and foment the udder, and draw the quarter every day until pus disappears. Should the disease be too far gone for mild measures, or if daily attention cannot be paid, the teat may be either cut off by the neck, or a good opening made with the knife in the fleshy udder close to it. The only subsequent difficulty would be from attacks of flies on the wound, unless the weather become cold for a few days. This form of disease is effectually prevented by rubbing the vessel, at least three times, at intervals of two or three weeks, with a mixture consisting of Archangel-tar, two parts, and butter or grease, one part. By beginning in June, the fly is kept off, and moreover the tar acts as a stimulant, although the grease dilutes it sufficiently to prevent blistering.

2nd, Common Inflammation, "garget" or "hard udder," appears when cows are in milk, and have been badly managed or injured in some way, the gland being swelled and hard, red, hot, and painful. It most frequently follows "overstocking," "hefting," or "mismealing" (viz., stopping milking for a time to enlarge the udder and increase the show of milk in preparation for sale or exhibition); or it may result from exposure to cold immediately after calving—it is then spoken of as catarrh of the udder, weed, or garget.

The Treatment is to apply mustard to the back, and to rub the udder with iodine ointment, lard, or goose-grease to stimulate and soften the part; to milk frequently, and foment with hot water; or, in extreme cases, to use bran poultices, slung up against the udder by means of a broad band of strong canvas passing over the back, and give linseed oil or treacle to open the bowels.

Impaction of the Rumen or first stomach is not uncommon, when cattle are in poor condition, and the functions of digestion consequently weak. It may be caused by unsuitable food, as when cattle are fed solely on cut straw and pulped roots; when much use is made of dry concentrated rich food such as cotton-cake or bruised grains; or it may occur when cattle are turned out to benty land on the hills in spring. *Treatment.*—Withhold bulky food, and support the animal with gruels, which digest without being cudded like long food; give stimulants, such as carbonate of ammonia, and repeated doses of oil or treacle to keep the bowels open.

Persistent impaction may be caused by something hard lodging in the stomach, such as a piece of old shoe leather, which some animals are fond of picking up and chewing. This can only be got rid of by cutting a hole into the stomach on the left side, removing the foreign substance, and giving very little food for a few days until the wound heals.

Choking is most frequent when cattle are fed on whole potatoes or small turnips. If an animal is permitted to elevate its head, a piece of the unchewed root is liable to slip over the throat, and to lodge in the gullet, which spasmodically closes before it, and the proverbial "lump in the throat" becomes a dangerous reality. A "probang" is not a safe means of relief unless in very skilled hands, the gullet being so easily ruptured if force is applied. The most simple and effective practice is to keep the mouth open by introducing a wooden gag like a large bit, to prevent the formation of gases in the stomach, and to avoid choking by saliva which then runs from the mouth in place of into the windpipe; a little oil and sulphuric-ether, sufficient to lubricate the part, may also be given with advantage. To drench a choking animal with salt and water is a barbarous and dangerous practice (although the violent coughing which is set up, may help to relax the muscular contraction of the gullet), as the gullet being closed the solution must find its way into the windpipe and bronchial tubes, and produce great irritation and discomfort, if not organic disease. Choking may be prevented by keeping down the heads of the animals while feeding on roots in their stalls by letting drop on the backs of their necks a long pole, about three inches in diameter, hinged to and suspended from the rail supporting the upper ends of the stakes to which the cattle are tied.

Lameness is generally produced by casual injuries, by something hard, such as a small stone, picked up and fixed between the digits, or by scalding in wet seasons. A hind-leg can be held up for examination and treatment, by a man on each side standing close to the cow, and lifting by means of a stick, about the length and strength of a one-horse whipple-tree, which is placed across between them in front of the animal's hough. A strip of strong canvas, drawn backward and forward between the hoofs, should be used to clear away all dung, earth, or other foreign matter which may have lodged there, to admit of a thorough examination of the part, and to prepare for a footrot-mixture, or some other acid stimulating dressing, which should then be applied by means of a thin splinter of wood.

Cows or bulls which are not allowed much exercise, become lame through the hoofs not being naturally worn by walking, so that they grow long and turn up at the toes. The overgrowth of horn may be removed by sawing, followed by the using of a pair of long-handled powerful shears for dressing or finishing.

CHAPTER XII.—PIGS.*

Pigs—*Sus scrofa* and *Sus Indicus*—General Show Points of Improved Breeds—The Bacon-curer's Pig—Changes in Feeding and in Curing—Distinguishing Characteristics—Yorkshires—Large, Small, and Middle Breeds—Scotch White Pigs—Black Breeds—The Berkshire—The Essex—The Tamworth or Staffordshire Breed—General Management—The Breeding Sow and her Treatment—Fattening Pigs—Feeding—Cooked *v.* Uncooked Food—Warington's Estimates of Dead and Live-Weight—Berkshire Crosses and their Yield—Cost of producing One Stone of Pork—Number of Pigs kept in a Dairy—Diseases of Pigs.

PIGS are divided into two groups—*Sus scrofa* and *Sus Indicus.*

The latter, or Chinese pig, is by far the more improved (refined) of the two, from the modern breeder's point of view.

The Scrofa, the European pig, is sprung from and resembles the wild boar. As compared with the Indicus type, it is longer, leaner, narrower, coarser in bone, in hair, and, in short, in every way; the nose is longer and the forehead narrower, but these defects in form are correlated with a hardier constitution.

Improved pigs in this country are usually divided into two classes, White and Black, but the chocolate-coloured Tamworth deserves now to be mentioned as a third class.

The Whites prevail in Scotland and the north of England; the Blacks in southern England. Between the two, in central England and Wales, are to be found the russet colours and combinations of the three colours, the result of crossing. All have been improved by crossing the native Scrofa pigs with specimens of imported Indicus, and by selection. The Berkshire and Essex breeds, for instance, were improved about half a century ago by the use of a number of imported pigs belonging to an Italian breed, the Neapolitan, which had been dashed with Indicus blood.

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* For a list of the Herd Books see Appendix C.

Improved breeds possess a much greater tendency to fatten, and they have more symmetrical forms, but they are not so active and hardy in constitution as the older kinds. Close-breeding is shown by want of sufficient hair, barrenness, or deformity of structure. There are many mixed or small local breeds in Britain, but only a few of the leading ones need be described.

POINTS APPLICABLE TO ALL IMPROVED BREEDS.

(*Show-yard Standard.*)

In judging, it is best to begin at the feet and legs, as these are most important, on account of their having to carry the weight when the animal is fat and heavy.

The *feet* should be small and neat; the *legs* perfectly straight, fine boned, and fleshed down as far as possible in both fore and hind quarters; the *back* broad before and behind, not drooping too much at the rump when the animal walks.

Pigs are all liable to arch in the back and droop at the rump when standing.

The back-line should be straight, and it should extend over the neck; the belly-line parallel, and continued below the jole; the *ribs* well sprung and deep; the *neck* thick and of medium length; the *ears*, in most, not too large or flapping; the *head* small, broad between the eyes; the *nose* short; the under jaw shorter than the upper; the *cheeks* very full; the *eye* not too small, quick, but mild; the *tail* long, and a tuft of long hairs on its tip; the *body* well covered, all over, with flesh, and of a rectangular shape from all points of sight, deep and wide before and behind; the *skin* medium in thickness, and covered with an abundance of hair.

Though the points enumerated are those looked for at shows, it has been most forcibly pointed out by Sanders Spencer,* one of the most successful breeders of white pigs in England, and also by those interested in the bacon-curing trade, that the most economical pig to breed, and consequently the one which ought to be encouraged in the show-yard, should be long in the body, a good medium depth in the ribs, light in the neck and forequarters, and heavy and deep behind in the hams or gammon ; or, as A. W. Shaw of Limerick has tersely put it : "What is really wanted is a pig that is neat in the head, light in the neck and shoulders, deep in the heart, thick in the loin, stout in the thighs, and short in the legs,"—the reason being that changes in the curing trade and pork market have resulted in certain parts of the animal being of greater value per lb. than other parts, as will be seen from the accompanying plate after an original diagram exhibited by A. W. Shaw. The shoulder and neck being of least value, it is shown that it is a waste of food substance to transform it into flesh of inferior quality, if by selecting animals with tendencies to greater development in the more valuable parts a greater amount of material on the higher division of the scale of market values can be produced.

A great change has within comparatively recent times come over the system of feeding pigs, as well as of curing their carcasses. A generation ago it was the custom to kill pigs about two years old, at enormous weights, after the flesh had become coarse. The method of curing left the lean portion gorged with salt, hard, indigestible, and uninviting : then it was an advantage to have a large proportion of fat to lean. Now, however, the systems of mild-curing renders the flesh sweet and juicy, and all efforts are directed towards the production of as

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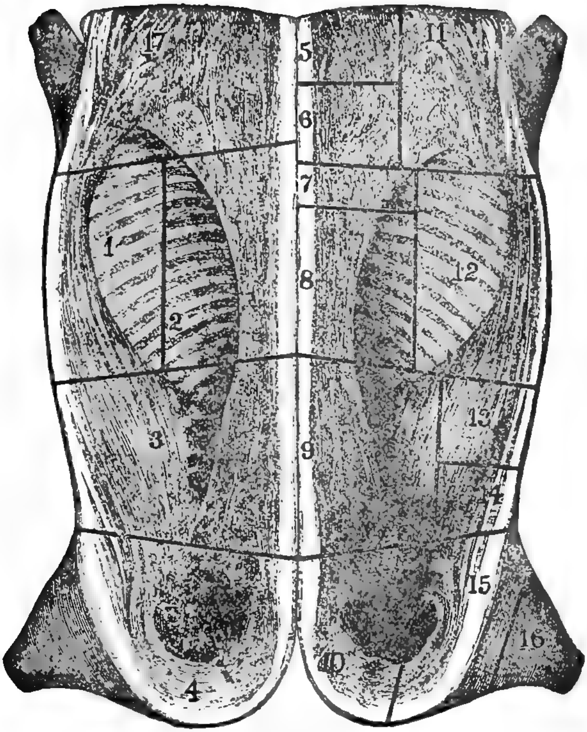
* Paper read at the Irish Conference of the British Dairy Farmers' Association, May 1887, by S. Spencer, Holywell Manor, St Ives.



Model Sides of Bacon.

No.		Current Prices per lb.	No.		Current Prices per lb.
1.	Streaky Quarter	11d.	10.	Fillet	10d.
2.	Rib Quarter	11d.	11.	Shoulder-	6d.
3.	Middle Quarter	8½d.	12.	Prime Streaky	11d.
4.	Ham Quarter	8½d.	13.	Thin Streaky	8½d.
5.	End of Neck	7½d.	14.	Flank	6½d.
6.	Middle of Neck	8½d.	15.	Middle of Gammon	11d.
7.	Thick Back and Sides	10d.	16.	Knuckle of Gammon	7d.
8.	Prime Back and Ribs	11d.	17.	Fore-End	6d.
9.	Loin	10d.			

Reproduced from the paper mentioned in footnote, page 156. Though the prices are not changed they fairly represent current rates, which vary according to local circumstances in different places, or localities of the same place.

American pork or bacon may be known by the roots of the hairs or bristles being arranged in groups of two or three hairs together, while the hair on the skins of pigs reared in the British Isles is more regularly distributed.

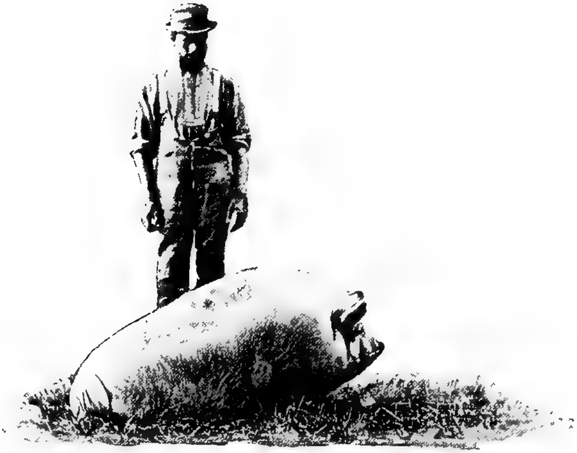
great a proportion of lean to fat as possible. The large increase of the consumption of fresh pork has also encouraged the demand for young, lean bacon ; and, on the other hand, the change of fashion which has put young and tender pork on the market has helped to increase its consumption.

The best quality of pork is produced in moderately cold weather. The low temperature renders the flesh firm, it is also produced at a slower rate in cold weather, and is in consequence more mature. There are striking differences in the market requirements in the great pork consuming centres of the United Kingdom. For the Newcastle trade, pigs weighing from 5 to 9 stones are in best demand ; for Birmingham, they require to be of medium weights—10 to 15 stones—and for Bradford and Manchester, heavy weights of from 14 to 20 stones, are in most demand. There has in recent years been a tendency to boom small porkers, as there has been a run upon small-sized cattle and small-sized sheep. Carcasses of moderate dimensions are no doubt more easily manipulated, and more easily disposed of in a limited business or to people with small families; but there is no question that for excellence of quality, the flesh of a pig weighing 20 stones is much finer and more mature for the purpose of making into bacon than one of half the weight. A large proportion of the pork consumed in the populous centres is eaten fresh, or made into sausages. The flitches or middle portions consisting of the sides and belly, weighing from 18 to 28 lbs, are frequently salted for four or five days, and sold as bacon.

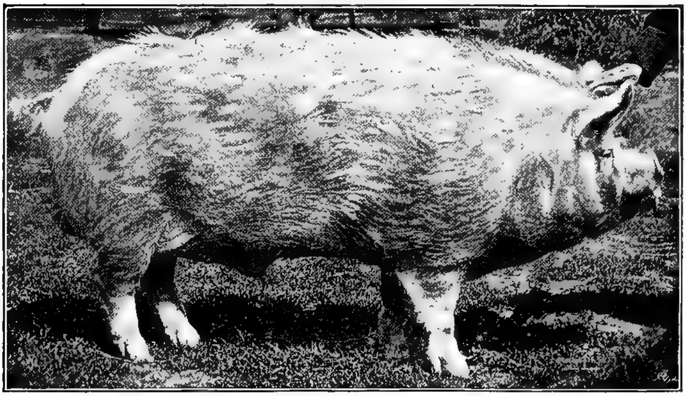
DISTINGUISHING CHARACTERISTICS.

WHITE BREEDS.

The Large Yorkshire is the largest breed of pigs in the United Kingdom, and one of those most directly descended from the original pig of the country, and, it is



A.—SMALL WHITE YORKSHIRE SOW, "PRIDE OF OXFORD."
In 1878 First at Bristol, also Two Champion and Ten other Prizes.
Bred by SANDERS SPENCER, Holywell Manor, St Ives, Hants.



B.—LARGE WHITE BOAR, "HOLYWELL WINDSOR."
The Winner of many Prizes.
Bred by SANDERS SPENCER, Holywell Manor, St Ives, Hants.

asserted, without its having been crossed with foreign blood. It has been vastly improved within recent years, but still it inclines, even in its modern form, to exhibit the points of the wild pig, viz., a hardy constitution, more or less drooping hind-quarters, large head, long nose, large overhanging ears, strong bone, flattish sides, and, when the great length and weight of the Yorkshire are taken into account, proportional narrowness as compared with the Berkshire. The size to which the animals are now reared has been much reduced within the last generation, but this is more a matter of change in the system of management than a change in the character of the breed. It was no uncommon sight at the Royal Agricultural Society's shows a few years ago to see large Yorkshires estimated to weigh over 50 imperial stones, or as much as a bullock.*

The tendency to early maturity, arrived at by care in breeding and good feeding and management, has yet left as an attribute of the breed the property of lean flesh production as against fat production,—a quality which continues to find favour with bacon-curers and the public taste.† It is thought that the general improvement of the large breed of White Yorkshires was initiated by crossing with improved Leicestershire white pigs, which had themselves been improved by Bakewell, who applied to pigs the system of breeding already explained under cattle.

The Small Yorkshire is descended on one side from the same native ancestors as the large Yorkshire, nevertheless the two breeds resemble each other in nothing but colour. The small breed is noted for its refinement and beauty, its small bone, and its great tendency to fatten,—qualities which have been acquired through its ancestors crossing with Chinese pigs.

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* Sanders Spencer's boar, Sampson VI., winner at the Royal Society's shows at Carlisle and Derby, weighed 9 cwts. as he walked.

† Referring to the foreign trade, Sanders Spencer, writing to us in 1889, says that during the last four years breeding pigs (boars especially) have been sent by him to many important centres of bacon curing in Ireland, Canada, Germany, Holland, Denmark, Sweden, and quite recently to Russia, where the Government are assisting in the establishment of bacon-curing factories.

The small white occupies among white pigs the position which the Southdown sheep holds among the Down breeds. It is not, when bred pure, so much a tenant's pig as a landlord's or a gentleman's pig. It produces excellent fattening animals by crossing with common pigs, or even with the Berkshire. It has been used for crossing in the improvement of inferior breeds.

Points.—The body is rounded, plump, and symmetrical; the head small; the ears small, erect, and inclining forward; the face excessively "dished"; and the nose straight while the animal is young, but becoming much contracted and quite turned up after a time like the nose of a pug dog.

The leading drawbacks to the breed are the small number of young usually produced at a birth, and the general delicacy of constitution, necessitating extra care and attention, especially while young. Both points of weakness are no doubt due to close-breeding; but in the matter of hair the animal does not seem to have suffered in at least one of the ways in which the injury from in-breeding usually shows itself, the small breed being famous for a profusion of long and silky hair. Its refined character of flesh suits it best for producing porkers, but the want of a due proportion of lean flesh to fat, besides a want of balance of parts in the animal according to the demands of the bacon-curing trade, excludes it from being a favourite with bacon-curers.

The Middle-bred Yorkshire is the product derived from crossing the large and the small Yorkshire breeds. As might have been expected, in accordance with the general laws and principles of breeding, the small and so-called improved breed has stamped its likeness more distinctly on the produce of the cross than the large and less refined Yorkshire. The middle breed is little more than a large variety of the small white, being only slightly modified in form through its relationship with the larger animal. Theoretically, it ought to combine the good qualities of the two distinct breeds, but as yet the want of uniformity of type and the uncertainty as to the character of its progeny are not fully overcome.

The recent changes of fashion in the market have been rather in favour of those qualities which are produced in the most perfect form by the large white and the Tamworth breeds as against the quality for which the small breed is prized, viz., that of producing at a rapid rate quantities of over-fat meat. Had the middle breed taken more after the large than the small variety, it might have secured even a greater share of good favour than has fallen to it.

Sanders Spencer, of Holywell Manor, St Ives, the most extensive breeder and exporter of white pigs in this country, describes and compares the three Yorkshire breeds as follows :—

"**The Large White** should have a good coat of straight white hair of fine quality, and a white skin, with sometimes a blue spot or two. This last characteristic is being bred out by those who have a connection with the foreign trade. The foreigner looks upon it as an indication of cross-breeding, although it is not necessarily so, as large white pigs of the purest strains will occasionally throw a pig with a few spots. Nevertheless many of the so-called 'large whites' which have been exported have had a cross of Berkshire blood, which indicates its presence by the appearance of black spots, both on skin and hair, in the second generation.

In size, the large white pig cannot be too large, unless size is gained at the expense of quality. The head should be of fair length, and wide between the eyes ; the jowl light ; the lower jaw slightly curved ; the ears inclined forward ; the shoulders no wider than the hips ; the ribs well sprung ; the carcass deep ; the flank thick ; the quarters lengthy ; the gammon, or second thigh, reaching to the houghs ; the legs straight and well apart, and possessing no more bone than is sufficient to support and transport the carcass.

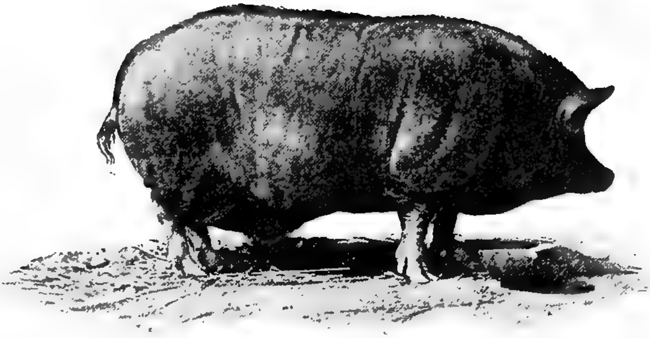
Improved large white pigs are ready for the butcher at any age, and if properly fed and allowed sufficient exercise they will furnish bacon of the quality now most in demand. They are not only prolific, but they are excellent mothers, and rear large litters. A sow bred at Holywell Manor, and sold to Mr Hawes of Derby, reared 48 pigs as the produce of four farrowings.

The Middle White is a shorter, thicker, and more compact pig. In the matter of quality (except that the carcass is not quite so lean) it is very similar to the large white. In comparing the points of the two breeds in detail, the head of the middle-bred pig is shorter and heavier; the ears more upright, or pricked; the nose more turned up; the legs shorter; the hair more abundant, finer, and softer. It is not quite so prolific as the large white, nor does it make such rapid growth when young, although it fattens as quickly when it reaches the age of six months.

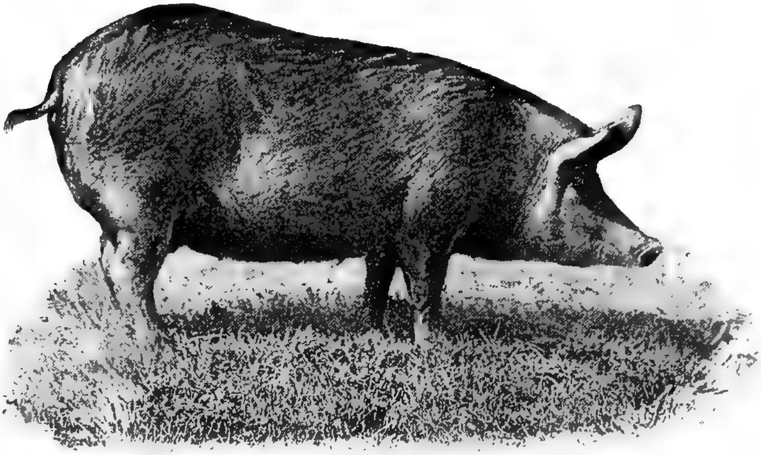
The Small White is now but very little bred in this country. The enormous increase in the demand for lean bacon has led to a complete change in the form and style of pig sought for by feeders within recent years. The small white, when well grown, will convert meal into pork at less cost than any other breed of pig, but it grows slowly when young, and the sows rear but small litters, although they are often prolific. The form of a small white is much like that of the middle-bred, only on a smaller scale. The ears are pricked, and the jowl heavier. Blue spots are looked upon as a sure indication of a cross having been introduced by one of the large varieties.

Lincolnshire Lop Ears are large and rather coarse pigs, but they are good feeders. They have long straight noses, with an abundance of curly hair. They are often a little heavy in the forequarters, and in this they do not tend to conform to the fashion of the times.

The Common White Pigs of Scotland possess some of the characteristics of the large Yorkshire,—for example, long noses and long legs,—but they are hardier than pigs of the improved pure breeds. They are slower feeders than south-country pigs, but milk well, and breed excellent crosses by the improved Berkshire or the Yorkshire boar. The cross, when fat, or large enough to weigh 12 stones of dressed pork, yields about 1 stone less offal than the pure Scotch pig.



A.—BERKSHIRE BOAR.
The Property of RUSSELL SWANWICK, Royal Agricultural College Farm, Cirencester.



B.—TAMWORTH SOW.
Bred by R. N. NETHORPE, Scawby, Brigg.

DARK BREEDS.

The Berkshire is black, with a pinkish skin ; a little white on the nose, the forehead, feet, and the tip of the tail ; the nose straight, but the face more or less depressed, "dished," as is the case with all pigs. In size it is intermediate between the small and the middle-bred Yorkshires.

Defects that are frequently met with in Berkshire pigs are :—The *quarters* drooping on account of being too short, and the *tail* in consequence too low set ; the *ribs* flat, causing deficiency of girth ; the *skin* furrowed, with deep wrinkles down the sides ; the *flank* light, and the animal leggy ; the *absence of white* on the tail indicating the presence of Essex or other black blood ; the *hair*, when too hard and strong showing want of breeding, when not abundant (especially in the boar) want of constitution.

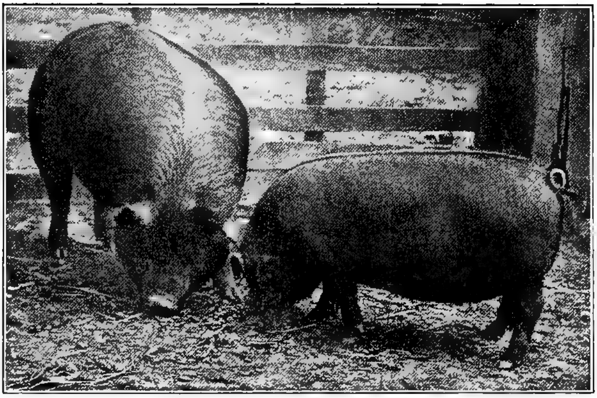
Berkshires are universal favourites where the climate is suitable—the boars being valuable for crossing with common stock. They are widely distributed throughout both England and America. Crosses by the Berkshire boar on white pigs are often partially red in colour, showing the relationship of the breed to the chestnut-coloured native pig, from which the Tamworth has also sprung. The produce of a Berkshire sow by a white boar is almost invariably white, though dark colours frequently appear in after-crosses.

The Essex pig is much like the small Yorkshire and Berks pig, but is altogether black. Though not so widely known, it is well bred, and possesses excellent points, including a compact symmetrical figure and a small well-formed head. Like other varieties of the same black type, **Dorsets, Devons, Shrops,** it has become by natural selection well suited to local conditions. All these breeds are improvements on the old forms of the localities which give the names.

The Tamworth or Staffordshire Breed, from the neighbourhood of Birmingham, seems to be the most direct descendant of the aboriginal pig of the country. If crossed with the imported Neapolitan and Chinese pigs, which were used in the improvement, or more correctly the refinement, of all the other breeds of this country, the influence of the cross has not been so distinct, as may be seen from the natural activity or restlessness of the Tamworth, the greater length of snout, and the greater tendency to grow a large proportion of lean bacon. In this respect the Tamworth resembles the large Yorkshire, and is in its improved form a favourite with bacon-curers, who object to a great proportion of fat, a heavy jowl, and excessive breadth of back. The common uncared-for specimens of the breed are undoubtedly leggy, ungainly in appearance, and slow maturity animals, but these defects have within the last ten years been greatly modified, it is said, by crossing with the Yorkshire breeds. The improved pigs still retain the great length of snout and hardiness of constitution of the original breed, and are through selection attaining the power to lay on flesh rapidly. The great function of the Tamworth breed as a bacon producer, ought to be to breed crosses by animals of the Berkshire or Yorkshire breeds. By this means good pigs for fattening purposes can be secured. The colour of the breed is reddish or chestnut, sometimes a tawny gray with black spots. This is a breed which has come but recently from local obscurity into public favour, and is likely to have a successful career in the immediate future. Separate classes for Tamworths have been formed for the last eight years at the shows of the Royal Agricultural Society.

GENERAL MANAGEMENT.

The Breeding Sow should be lengthy rather than short, yet not out of proportion, and should possess the characteristic points of her breed. She may be put to a



SUFFOLK OR SMALL BLACK PIGS.
The Property of Her Grace THE DUCHESS OF HAMILTON, Easton Park, Wickham Market, Suffolk.

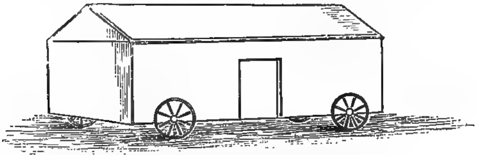
young boar for the first time when large enough to breed, say at six months old. If she is not impregnated (in common language if she is "missed"), she will come in season again in exactly three weeks. The period of a sow's gestation is sixteen weeks. Breeding swine should run out till farrowing time is near, to save expense, and to get plenty of exercise and abundance of green food. There ought to be six or eight pigs reared in the first litter, and ten to twelve or even more in each after-litter if the sow has teats enough. It is not a good practice to permit a brood-sow to suckle more pigs at a time than the number of her teats, as the weak ones are invariably kept back by the strong, starved and stunted in growth, so that they do not pay to feed if they do live. A bad milker, or one which kills or eats her young, ought to be fattened off. Sows kept to breed pigs for fattening pay best if fed for bacon after the second or third litter is weaned. Pigs are usually weaned when about six or eight weeks old, and a sow comes in season for the first time after breeding (according to condition) about three days to one week after the pigs are removed. Forty-six to fifty weeks are thus occupied, according to the age of weaning. A sow may be made to have five litters in two years, in place of two litters in one year, by beginning to feed the young on milk at two or three weeks old, gradually thickening the milk with oatmeal porridge, and, after a little, turning the mother out during the day and feeding her liberally. She should then take the boar before the pigs are weaned, when they are about five weeks old. When milking very heavily, an animal is not in that condition in which she is most likely to come in season or conceive.

All pig-houses should be warm in cold weather. No animal of the farm is more injuriously affected by cold or damp than the pig. "Sows" should be managed so as to have the young born when the weather is mild, and ready at the season of the year when there is most food for them.

A few days before farrowing, a sow should be put by herself into a place the floor of which is about 10 feet square, fitted round with strong planks placed horizontally, projecting 8 or 9 inches from the wall, and elevated the same distance from the floor, to prevent the sow lying close to the wall and smothering the young pigs by overlying them. The planks also form a protection from cold in frosty weather. One section should be floored by a raised wooden platform of 1-inch boards to keep the bed dry. The person who is to attend at farrowing should take charge of the sow from the time she is separated from the others, and the place should be well littered with straw. The sow takes up straw in her mouth to make a bed within a few hours of farrowing. The operation of farrowing may extend over hours, but the sow requires no assistance: she is very sick and quiet, and should lie all the time. It is a rare occurrence to see a pig dropped while the sow is standing. When restless, she is very troublesome and liable to crush the young pigs. Sometimes they are put at once into a warm basket to be safer than by the mother's side. They should have a suck as soon as possible, and be watched day and night for three days. A safety-lamp may with advantage be left hanging at night after this for some time. The food of the mother should be sloppy, and for the first two or three weeks after farrowing largely composed of sharps and bran, but afterwards made more nutritious by the addition of barley-, oat-, wheat- or rye-meal. If whey is given to the mother without being boiled or soured, it is liable to induce diarrhœa in the young pigs. Young pigs grow very quickly during the first few days. The ones which maintain possession of the teats nearest the forelegs are usually the largest and strongest. Each has its own teat or teats, although they steal from each other whenever an opportunity occurs. They cannot draw milk at all times, but only when the sow permits it. She then lies flat on one side, and utters every now and then a subdued grunt, while the young ones suck with an avidity peculiarly their own.

Fattening Pigs.—A farmer or dairyman should breed his own pigs, for then he secures the whole profit and reduces the risk of importing hog-cholera (the bane of the pig-breeder's life), or other diseases, which, as in the case of foot-and-mouth disease, might extend to his cattle. Young pigs vary much in price—12s. to 30s., or more, at weaning—1 guinea being a good average, and leaving a satisfactory profit to the breeder. A pig-house to hold five or six pigs ought to have a southern aspect, and stand in a sheltered and dry position, and consist of an inner compartment and outer court, severally 8 to 10 feet square. Six pigs of 12 stone estimated dead-weight each, have ample room to feed at one time from a trough 8-feet long. It is better to feed in the outer court rather than under cover, as pigs then keep the place they select to lie on cleaner, by leaving their droppings in the court. There are great differences in individual pigs in the matter of cleanly habits. Some deposit their solid excrement in one corner of the sty, while others drop it anywhere, but when the house is constructed on a good principle cleanly habits are those most likely to be formed. No bedding is required if the floor be smooth concrete with a fall inside of 2 inches towards the doorway, and if it be swept out every day. The outer court floor should have a greater fall into a sink-hole in the centre over a covered drain if water be available to swill it daily. In the absence of an abundant water supply, the drainage of the pig-sties should be carried off by an outside surface channel. Another serviceable floor is made by paving a layer of movable open-jointed bricks above a layer of dry sand, which drinks in the liquid that finds its way into the open joints. Feeding-troughs are best made of fire-burnt clay, with a division for each pig, to prevent the weak being driven out and starved by the strong. At dairy-factories, where fifty or sixty pigs are placed in one large house and fed from long troughs, a number of weak ones are always kept back till the others are satisfied, and in consequence do not thrive. Male pigs are castrated when about four weeks old and after fasting for 12 hours, but not during frost. Those for breeding are turned into a yard or field, and left to grow for a few months. A ring is put through the gristle above the nostrils to prevent their exercising the instinctive habit of digging, or grubbing up the surface in search of roots and the larvæ of insects. Mangel-wurzels, turnips, cabbages, clover, vetches, or silage may be given uncooked and alone, or with a limited supply of other food.

Pigs going at large at a considerable distance from the homestead should be provided with a shelter shed. A convenient form is shown in the accompanying figure, capable of accommodating five or six well-grown pigs. It can be easily moved to a new site when necessary, and placed so that the one opening shall be on the lee side to secure warmth.



SHELTER SHED ON WHEELS FOR PIGS.
9′ × 5′ × 3′ to the Eaves, costing about £3.

Feeding.—After weaning, which should be done gradually, as before described, pigs can be fed for months on sour whey as the only food, and do fairly well. Any skim-milk used should also be soured by being put into a tank or barrel tainted with the natural acidity which arises in a vessel left unwashed after containing milk, as milk in a sweet condition induces constipation. It pays well, while feeding with these or with buttermilk, to thicken the food, which by itself is too liquid, with meal, boiled or steamed. A *mixture* of meal is best, and may contain beans, peas, gram, lentils, vetches, wheat (including bran, germs, and pollards), barley, oats, maize, or Indiana—the refuse from corn-flour works, viz the outside or most nutritious part of the grain. The selection should depend on what possible ingredients are cheapest in the market at the time. Small and inferior grain is usually selected. Costiveness is avoided by mixing bran with the food. The dung of a thriving pig should be soft and unformed. Roots are also frequently given, such as mangels, turnips, carrots, parsnips, as well as small potatoes and cabbages. All roots should be cooked for fatteners, and raw potatoes ought never to be given to a pig of any kind. A little common salt is a necessary seasoning. Any "fallen" flesh (as that of a horse or other animal of the farm) strengthens the boiled mixture and improves its flavour; but if too much flesh is used (as at a slaughter-house), or if the other foods are given without enough of meal, the pork will be soft and inferior. Leguminous seeds, particularly, solidify the flesh. Maize consumed alone is an unthrifty food-stuff, although when cheap it forms a suitable ingredient in a complex meal-mixture. All cooked food should be given slightly sour and cool, but not cold. Some extensive breeders disapprove of boiling the meal in preparation for pigs, and prefer to give it dry or soaked with cold water. Important experiments conducted in the United States of America have shown results decidedly in favour of uncooked food. Uncooked meal should be given in a much drier condition than boiled meal, else it is liable to be swilled through the stomach too rapidly. Fattening pigs are usually fed at least three times a day, but it is better to feed four times, and when they are newly weaned, five or six times daily. As much food as is eaten up at once, and no more, should be given. A few coal ashes or earth thrown now and then into the outer yard for the pigs to eat improves their powers of digestion. Sometimes pigs are washed or brushed once a week. When kept perfectly clean they will not roll in the mire, unless for the sake of coolness in hot weather. They seem to go into mud for the purpose of cleaning themselves. The mud adheres to the skin, cakes as it dries, and in falling off carries scales and dirt with it.

Warington says that "83 per cent. of the fasted live-weight of a pig (fattened for pork) should be butchers' carcass;" and also that "91 per cent. of the increase from 100 lbs. to 200 lbs. will be carcass." About 5 or 6 lbs. of meal consumed by a pig should produce 1 lb. of increase of live-weight. Pigs are the most economical meat-producers on the farm. They consume more food per 100 lbs. live-weight than either sheep or oxen, and have much greater capacity in the intestines for assimilation, although their stomachs are small. They consequently require a good proportion of concentrated and digestible food.

Crosses between the Berkshire and Scotch pig will, if properly fed and skilfully managed in summer when the weather is mild, weigh 6 stones dead-weight each at four months old; and at six months, 12 stones. The average age at which pigs are killed, is probably about seven months. They are usually disposed of for small bacon when they dress to 12 or 14 imperial stones, and sell at from 6s. to, at times, 7s. 6d. per stone. A good twelve months' pig should weigh 24 stones, about 16½ score, or 14 lbs. less than 1 lb. of increase per day, for the last six months (182 days : 168 lbs.); while for the sixty-one days, between four months and six months, it lays on 1·377 lbs., or roughly, 1⅓ lb. per day, of dead-weight (61 days : 84 lbs.).

A pig lays on flesh fastest when from about 9 stones to 12 stones weight, and will then consume about 10 lbs. to 12 lbs. of meal, and increase over 2 lbs. live-weight, or nearly 2 lbs. dressed pork, per day. It is thus most profitable to kill when a pig is estimated to weigh about 12 to 14 stones dead-weight. Any of the improved breeds should do about the same as the above. It is the usual practice to give pigs rather more time to grow, and to allow them to run freely about while young. This permits of their being fed upon home-grown green food. At eight months old, after being in closer confinement for the purpose of feeding off, they ought to reach the weight of 12 stones. The flesh of pigs fed entirely under cover is soft and inferior as compared with that of those which have access to open air and to sunlight and heat. The hair on the latter also develops better, and the animals are altogether more healthy both in look and in reality.

The price of mixed pig-meal, exclusive of grinding, should not average more than ½d. per lb. (£4. 13s. 4d. per ton), which gives the following cost of producing a stone (14 lbs.) of pork, with labour estimated at 7s. 6d. for each 12-stone pig:—

Cost of producing a Stone of Pork.

Labour 7½d., and cooking food 1½d., . .	£0	0	9
14 lbs. × 5 lbs. = 70 lbs. grain at ½d. = 2s. 11d.; *Ergo*, 83* : 100 :: 2s. 11d. :	0	3	6
Grinding grain per ton 8s., and carriage, say 6s. 6d. = 14s. 6d., or per stone of pork, .	0	0	6½
Average price of a young pig, £1, 1s. = 3 stones live-weight = 2½ stones of pork at 6s. = 15s.			
21s. − 15s. = 6s. for the life; 6s. ÷ 12 (the number of stones) = cost of life per stone, .	0	0	6
	£0	5	3½
Deduct for offal 1s. per £1 of the price (12 stones at 6s. = £3. 12s.), viz., 3s. 6½d. ÷ 12 (stones), ...	0	0	3½
Average cost per stone, ...	£0	5	0

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* The rule which adopts 83 p. c. of dead to live weight is here taken in place of the one showing 91 p. c. of increase of carcass, as the calculation is intended to indicate the average cost of producing pork at all stages in the life of the pig.

This calculation leaves a net profit to the producer of 1s. per stone, or 12s. per pig, in addition to the manure. The great advantage in feeding pigs is in the utilisation of light or inferior grains which cannot be marketed unless at a price below their feeding value, small or injured potatoes, or the refuse produce from the dairy, more especially whey and butter-milk. It ought to be possible to secure a greater price for separated-milk in large towns or on rail than 1d. per gallon, which is more than its full value for feeding pigs. It is a fact, nevertheless, that the consumption of skim-milk in the large centres of population has greatly decreased since milk-separators have been so generally introduced, and since the full-milk trade has expanded to the working classes.

One gallon of sweet-milk-whey is worth ½d., and is equivalent in value to 1 lb. of meal if given in pig-feeding along with solid food. It is usual to estimate 550 gallons of milk as a good average yield per cow in a well-conducted summer-dairy. One gallon of milk weighs 10 lbs. 4 oz., and 1 lb. of curd is removed in cheese-making from 1 gallon of milk, leaving about $\frac{9}{10}$ of the original weight as whey, or say 495 gallons, which, calculated at ½d. = 20s. 7½d., or roughly, £1 per cow. When meal for pig-feeding was rated at ¾d. per lb., whey per cow was estimated to be worth 30s., and would be so again should a rise take place in the prices of grain stuffs.

The number of pigs which may be kept in connection with a dairy of 60 cows, when sufficient meal is supplied to make good pork, is about 70—if they are killed at six months old weighing about 12 stones each (50 being finished off in the summer half-year, and 20 in spring and autumn)—in addition to 10 young breeders and a boar. The extra pigs reared but not required to feed should be sold at five or six weeks old.

DISEASES OF PIGS

Are not so numerous as in the case of most animals, but pigs are much more difficult to treat when ill than other farm stock. If fat, a pig should generally be killed on the first symptoms of ailment appearing, if the flesh is fit for food, as, at the best, no improvement in condition need be expected for a time.

It is a difficult matter to administer a drench to a pig. A ready and simple appliance to use is an old shoe with the toe cut off, pressed well into the mouth to keep the jaws open. The drench is poured into the shoe and passes into the throat of the animal from the opening made at the toe.

Fat pigs suffering from the effects of heat on the way to market are much relieved by bleeding close under the root of the tail by means of a pen-knife.

By improper housing, or exposure to cold and wet, pigs readily contract rheumatism, inflammation, and catarrh.

Diarrhœa often accompanies bad feeding. The *treatment* is, change to good food; give a purgative (Epsom salts 3 oz.) and 5 or 6 drops of oil of peppermint.

Foot-and-Mouth Disease is got by contagion from cows or other farm animals, to which pigs can also communicate it. It is not dangerous to life, though it leads to a heavy loss through retarding progress in growth and in improvement of condition. The hoofs slough off, and the animals cannot move about for a time. Salicylic acid lotions or carbolic acid and glycerine—½ dr. of acid to 10 or 12 oz. of glycerine—are applied to the feet, Epsom salts (2 to 3 oz.) administered, and sloppy food or milk given.

Scrofula.—Tubercles usually form in the lungs, and the animal after a time dies of consumption. This is oftenest seen when pigs are in-and-in-bred, but it is also encouraged by exposure to cold and wet. It may be in a great measure prevented by importing fresh healthy blood.

Protrusion of the Rectum is liable to occur when flesh is too abundant in a pig's diet. The treatment is simple, viz., to wash the parts well and return them to their proper position; to introduce stitches, crossing the anus from hip to hip, and to feed altogether on milk and treacle for a time.

Measles, also called "pig typhoid," is the most common disease among swine. It is accompanied by a red rash, a cough, and fever, and the animal ceases to feed. *Treatment*—keep warm, open the bowels with castor or linseed oil, and the skin with sulphur (1 oz. daily), and act on the kidneys with 2 drs. of sweet spirits of nitre.

Hog Cholera or Swine Fever is the great scourge of the breeder or rearer of pigs not only in America but also in this country. It is most contagious, and destructive of life. Through the application of the system of stamping out by the immediate slaughter of all in-contact animals as soon as it is discovered, it is believed the country might be freed from the disease, although it is admittedly a more formidable enemy to tackle than pleuro-pneumonia or foot-and-mouth disease.

Symptoms.—Costiveness in the first, and diarrhœa in the later stages, dulness, shivering, great thirst, and listlessness, the skin being covered with red and black patches.

Treatment.—Slaughter without delay, and burn the carcasses by the aid of a few ounces of paraffin oil. Washing out and white-washing contaminated places must be resorted to, and disinfectants liberally used to destroy all germs of the disease.

CHAPTER XIII.—THE HORSE—THE FOSSIL HORSE—THE WILD HORSE—CART HORSES—THE CLYDESDALE, THE SHIRE, AND THE SUFFOLK PUNCH.

The Horse—Early History—Fossilised Remains—Sub-genus *Equus* and *Asinus* —Evidence of the Existence of a South American Wild Horse—Przevalsky's Wild Horse—Effects of Climate—Farm Horses—Clydesdales—Prices and Pedigrees—Points of a Clydesdale—The Shire Horse—Differences between Shires and Clydesdales—Names and History—Quotations from Walter Gilbey—The Shire Horse Society and Stud Book—The Suffolk Punch—Its Origin and Characteristic Points.*

THE **early history** of the horse is written only on the pages of the rocks and of ancient deposits, if we except the pictures of the horse carved by "cave-dweller" artists upon horns and antlers. Remains of the ancestor of the domestic horse have been found in the Swiss lake-dwellings, showing that it must not only have existed but have been of service to man. at a very remote period. Before the horse was captured and domesticated, he was evidently used as a source of food, as in many early *palæolithic* stations the bones of the horse with those of the reindeer have been found in quantity. In some of the bone deposits in France as many as 20,000 to 40,000 skeletons are represented in a single place. The primitive horse here referred to was a diminutive animal of between 13 and 14 hands high.

Fossilised remains from the Eocenes in North America exist of animals resembling specimens of the *Equidæ*, and variously estimated to have been about the size of a fox or a sheep.

The most ancient forms had four toes on the fore-foot and three on the hind-foot, all touching the ground. More recent species exhibit three toes on both fore and hind-limbs, with an increase of size in the central, as compared with the lateral toes, but still all formed for action in walking. Those of a later date have the two lateral toes functionally useless, and carried up from the ground with the middle toe well developed. In the horse of the present day, as well as in that of the fossiliferous remains of Pleistocene and recent times, the lateral toes are still further reduced, being represented by splint bones, which do not appear external to the skin.

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* For a list of the Stud Books see Appendix C.

The true horse is in scientific language termed *Equus.* It is distinct from another sub-genus of the family *Equidæ,* viz., *Asinus,* to which asses and zebras belong, and which are represented by seven well-known genuine wild forms. *Asinus* is distinguished from *Equus* by the absence of warts or callosities on the hind-legs, by the contracted as compared with the rounded and well-developed hoofs, and by the long hair of the tail being confined to a terminal bunch.

Wild Horses.—All horses met with in a wild state are generally supposed, with one exception, to have broken away from civilisation. This implies that no species of horse now living existed in America prior to the Spanish "invasion," but an amount of evidence worthy of our consideration exists which goes a long way to establish the assumption that herds of wild horses roamed over the plains of South America before communication had begun between Europe and the New World. It appears that on the **map** of Sebastian Cabot, "*Pilota Mayer*" of Charles V. of Spain, which was executed prior to 1546-47, the objects of interest discovered by Cabot in 1527 on the east coast of South America are represented by drawings. In the upper reaches of the river La Plata, which was first explored at the period referred to, the horse is given with other animals which are known to have existed in that region. It is therefore probable that herds of native horses held possession of those plains now included in the territory of the Argentine Republic and of Paraguay, and that the wild horses of the present day in that region are their descendants crossed with imported Spanish horses. It is regarded as impossible that in the short space of twenty years which elapsed between the discovery of Peru and the time of Cabot's explorations in the La Plata, horses could have broken away in Peru and penetrated the "vast forests of the Andes" so rapidly as to reach these southern plains in time to be observed by the explorer. Professor Angelo Heilprin* says, "It would appear not exactly improbable, from certain references contained in old narratives, that at least in South America the animal still lingered on even after the advent of the Europeans." John Lawrence also remarks,† "The non-existence of the horse in America, previous to its discovery by Europeans, has, however, been disputed, but I recollect not by whom or upon what grounds." In W. H. Flower's recent work on the "Horse," an independent reference is made to Cabot's supposed discovery, which is regarded as possible in the light of the fact that forms undistinguishable from *Equus caballus*, so far as their osteological structure is concerned, "existed in America before its introduction by the Spaniards." Whether Flower's information is reliable or not, "it is certain," says Professor Cope, "that man was contemporary with species of *Equus* on the North American Continent."‡

Przevalsky's wild horse,§ *Equus Przevalskii*, is now at least the only genuine one. It was found in the deserts of Central Asia by the famous traveller whose name it bears, and was described in 1881. In colour it is "whitish grey, paler and whiter beneath, and reddish on the head. The legs are reddish to the knees, and thence blackish down to the hoofs." Its head is large and heavy in proportion to its small stature. The long hairs of the tail begin half-way down from the base, being intermediate in appearance between the tail of a domesticated horse and that of the ass. The ears are horse-like, but there is no forelock, and only a short erect mane. It has warts on the hind-legs as well as on the fore-legs, and its hoofs are broad and rounded. In disposition it is timid, shy, and difficult of approach, and so it has been rarely seen. One specimen exists in a museum in St Petersburg.

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* In "Distribution of Animals," 1887.

† In the "History and Delineation of the Horse," 1809.

‡ See the May (1892) vol. of *Wallace's Monthly*, Rialto Buildings, Chicago, to which the Author is indebted.

§ See a notice of it, *Nature*, 21st Aug. 1884, and also in Nicholson's "Manual of Zoology," 7th edition.

A horse can endure great extremes of cold and heat. When the ground is covered with snow it scrapes with its fore-feet to get at its food,* showing that its ancestors probably belonged originally to a cold country, where the habit would be acquired as a matter of necessity. "Arabs" have come to great perfection under very different conditions of temperature and climate.

FARM HORSES—

CLYDESDALES, SHIRES, AND SUFFOLK PUNCHES.

British work horses are usually classed as belonging to three breeds,—the Clydesdale, the Shire, and the Suffolk Punch.

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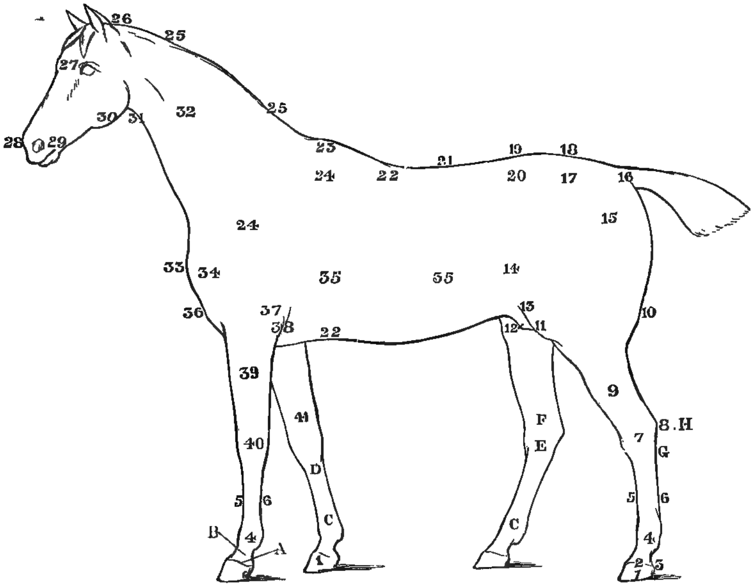
* European cattle do not scrape with their feet. Nevertheless, West Highlanders are enabled to get at food covered up by snow when other breeds would starve.



Forty Points of a Horse.*

1. Hoof.
2. Coronet.
3. Heel.
4. Fetlock or Pastern Joint.
    B. The Pastern.
5. Cannon-Bone.
6. Back Sinew or Tendon.
7. Hough.
8. Point of Hough.
9. Second Thigh.
10. Haunch or Lower Buttocks.

10 to 20. Quarter.

11. Stifle.
12. Sheath.

13, 14. Flank.

15. Hip Joint.
16. Root of Tail or Dock.
17. Rump.
18. Croup.
19. Loins.
20. Point of Hip Bone.
21. Back.

22, 22. Girth or Chest Measurement.

23. Withers.

24, 24. Shoulder Blade (*Scapula*).

25, 25. Crest.

26. Poll.
27. Forehead.
28. Muzzle.
29. Nostril.
30. Jaw.
31. Throat or Windpipe.
32. Neck.
33. Point of Shoulder.
34. Shoulder.

35, 35. Front Ribs and Short Ribs forming the Barrel.

36. Chest or Breast.

37 to 34. True Arm (*Humerus*).

38. Elbow.
39. Arm (so-called) or Forearm.
40. Knee.
41. Chestnut.

Seats of Common Diseases.

A. Side Bone.†
B. Ring Bone.
C. Wind-gall.
D. Splint.
E. Spavin.
F. Thorough-pin.
G. Curb.
H. Capped Hough.

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* For fuller details *vide* "The Exterior of the Horse," by Armand Goubaux and Gustave Barrier, translated from the French by Simon J. J. Hardger, V.M.D. Published by Lippincott Co., London and Philadelphia, at 30s.

† Side-bone is the result of the ossification of cartilege, and its seat is confined to the coffin bone or the largest bone of the foot. Ring bone is of a similar nature, but it ultimately involves one or both of the adjoining articulations.

THE CLYDESDALE HORSE.

History.—There is little doubt that like most of our well-known breeds of live stock, the Clydesdale is the result of the successful union of selected specimens from various other breeds, none of which possessed the good qualities in the same degree of efficiency as are now common among well-bred Clydesdales. Prolonged care in breeding has admittedly had its influence in raising the standard of quality. In connection with the **origin** of the breed, little credence is now given to the story told in 1810 by Aiton,* one of the early writers on the agriculture of the south of Scotland, who also doubted the accuracy of the report which he merely chronicled, to the effect that "one of the Dukes of Hamilton imported from Flanders, about the middle of the seventeenth century, six fine black stallions, which he kept at Strathaven Castle for the use of his tenantry and vassals." It would seem that the Upper Ward of Lanarkshire has long been famous for a breed of powerful draught horses, the character of the soil for producing frames of superior size having no doubt been the chief primary cause of its distinction in this respect. After the union of the crowns of England and Scotland in 1603, an important droving trade in cattle and horses sprang up between the two countries, which continued for over two centuries until it was checked by the development of the railway systems of the country. The Scotch cattle drovers going south with their herds of store bullocks, frequently brought back with them choice specimens of English colts and fillies, so that in this way the original stock of the country, before the name of Clydesdale was used with reference to the breed, would be blended with English blood, by animals some of the ancestors of which had been imported perhaps a century before from the Continent of Europe. The splendid success as a sire of a

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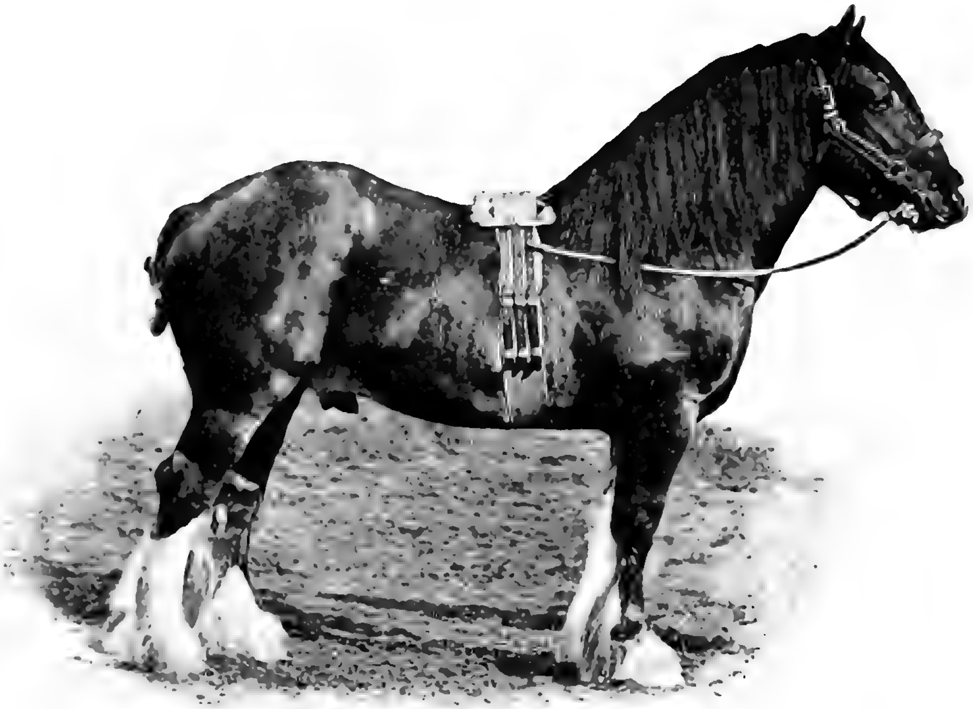
* Aiton's "Report on Ayrshire."



CLYDESDALE STALLION, "PRINCE OF CARRUCHAN," 8151
The Property of PETER CRAWFORD, Dumfries

black Flemish stallion imported from England by John Paterson, of Lochlyoch, about 1750, is strong presumptive evidence that the mares to which this horse was put were nearly enough related to him to prevent the appearance in the progeny of that tendency to variation which accompanies the crossing of animals of distinctly different breeds. Though the credit of establishing the Clydesdale breed is now generally given to Lochlyoch's black horse, it is probable that he was the first horse of many of a similar kind regarding which any written record was kept. But for the fact that the Paterson family possessed the then unique custom of recording important events in writing, we should probably have known as little of this famous horse as we now know of his presumptive predecessors. The Lochlyoch mares descended from this horse are recorded in the stud-book to have been

> "Generally browns and blacks, with white faces and a little white on their legs; they had grey hairs in their tails, along with occasional grey hairs over their bodies, and invariably a white spot on their belly, this latter being regarded as a mark of distinct purity of blood."

This no doubt gave origin to the impression that a pure Clydesdale ought to possess a white mark, however small, either on the forehead or legs.

It is interesting to notice that single white hairs appear scattered throughout the dark coats of many of the best Clydesdales of the present day, as for example through the bay coat of Prince Alexander.

It is a matter for conjecture whether some coaching blood was or was not introduced into the breed by a stylish black horse Blaze (named from the white marking on his face), which belonged to Scott of Brownhill, Carstairs, but the ancestry of "all the best and noted Clydesdale horses of the present day" can be traced to Glancer (335), *alias* "Thompson's Black Horse,"* which, there is little doubt, belonged to the Lochlyoch strain, and was consequently descended from the Flemish horse.

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* Bred by Somerville, Lampits Farm, Carnwath, about 1810.

From Broomfield Champion (95)—the foal of a grey mare—and the great-grandson of Thomson's Glancer (335), the Prince of Wales (673), and Darnley (222), were both descended. A considerable impetus to the breeding of good Clydesdales was given when the Highland Society began in 1827 to offer premiums for horses. One of the Society's rules was that all horses eligible for competition must be either "black bays or brown bays." Frame of Broomfield, one of the most successful stallion owners of the day, set a useful example to breeders by castrating all grey colts, thereby stimulating the desire "which now exists for bays and browns," and reducing the number of grey horses in the country.

The importation of English blood was not confined to the domain of ancient history. Tintock, a Shire horse imported by Galbraith of Croy Cunningham, Killearn, about twenty-five years ago, left a number of good fillies, his stock being more famous on the female than on the male side. From one of these was bred Damsel, which was for a time the champion mare of Scotland, in the possession of Martin of Auchendennan, and was sold at his sale for exportation for 500 guineas. Another Tintock filly was the dam of Lord Salisbury, who was also a champion and sold for export at £1500. Tintock took the second prize at Glasgow show in 1867, and travelled in the Strathendrick district during the same year. He was ultimately exported to Canada, where he was given the name of Conqueror. Old Brickhouse was bought at Horncastle fair (21 miles east of Lincoln) by Fergus of Brickhouse, and sold to William Park, of Dalmuir, to breed Clydesdales. She left three fillies by different sires, which were all champions at Glasgow show, and two were first both as "eild" and brood mares at the Highland Society's show. Lawrence Drew's Prince of

Avondale (not in the stud-book)—dam an English mare, and sire the Prince of Wales—left two champion mares, both got in the same year, and still (1892) taking first prizes.

The granddams of the Prince of Wales (673) were both known to be English or so-called Shire mares; but as the traffic in horses between the two countries involved the carrying of colts and fillies from Lanarkshire into England, it cannot be denied that these mares and other animals imported into Scotland were most probably to some extent of Clydesdale origin.

The most rational view to take of the position of matters, after setting aside all narrow prejudices of nation or of breed, is to regard the heavy draught horses of England and of Scotland to be different types of the same breed. The difference between the two so-called breeds amounts to nothing more than what may appropriately be covered by the term "different type."

Scotch breeders are rather proud that a number of successful English breeders attempt to follow the Clydesdale type by selecting and breeding from Shire animals showing strong Clydesdale points. James Forshaw, for example, with Bar None (2388), a horse of this description, secured the first prize at the London show in 1882.

Although many of the best Clydesdales of the day are probably heavier than the corresponding animals at any previous period in the history of the breed, still there is a tendency to diminished size in **the most fashionable cross of the day,** viz., between the Darnley mares and the descendants of the Old Prince of Wales.

In the keen competition for supremacy which took place between these two famous founders of the two great strains of fashionable Clydesdale blood, Darnley had the better of the Old Prince of Wales for a time in the show-ring, but the Prince fully regained his position in the estimation of the public as soon as the quality of his stock by the Darnley mares was recognised.

The Prince of Wales (673), foaled 1866, was bred by James Nicol Fleming, at Drumburle, Kilkerran, Ayrshire, and became the property (1) of David Riddell, Kilbowie, Duntocher; (2) of Lawrence Drew, Merryton, Hamilton; and (3) of David Riddell, (then) Blackhall, Paisley. The following is his showing record as given in the Clydesdale stud-book:—

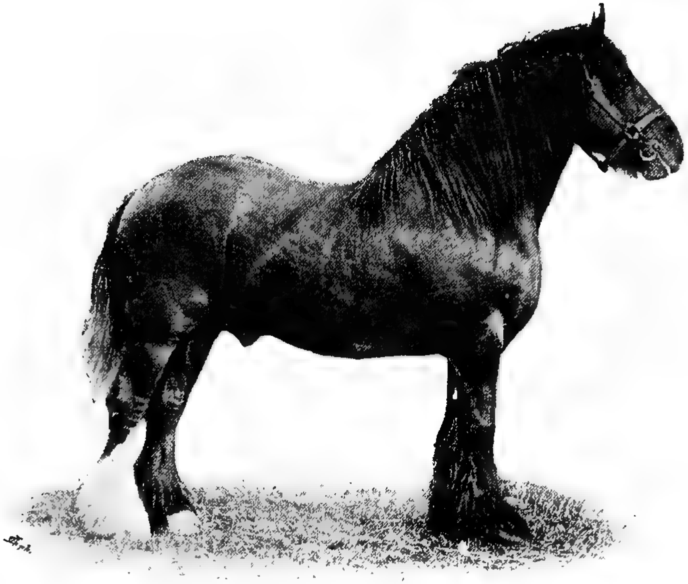
> "First prize at the Highland Society's Show at Edinburgh in 1869; second at Dumfries in 1870; first at Kelso in 1872; and first at the Royal Agricultural Society's Show at Manchester in 1869."

He was sold at the Merryton sale when eighteen years old for £945.

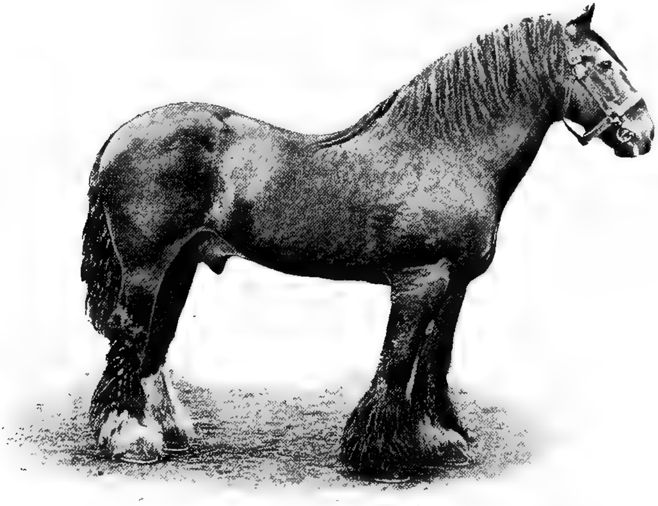
The Prince was a horse of splendid action, much better in this respect than Darnley, described below, although he was defective in his houghs, from the symmetrical point of view—being too straight and "corked" as if he had thorough-pin. He showed his English connection in the conformation of his head, in his prominent nose, and small and somewhat defective eye. The Prince had a will of his own, and his somewhat intractable disposition has been transmitted to many of his progeny.

Darnley (222)—also bay like the Prince of Wales,—foaled in 1872, was bred by Sir William Stirling-Maxwell of Keir, Bart., near Dunblane, and bought by David Riddell. His prize record in the stud-book is:—

> "Second at the Highland Society's Show at Stirling in 1873; the premiums of Glasgow Agricultural Society in 1876 and 1877; first at the Highland Society's Show at Edinburgh in 1877; and the champion cup at the Highland and Agricultural Society's Show at Dumfries in 1878; also second at the Royal Agricultural Society of England's Show at Kilburn, London, 1879; first at the Royal Agricultural Society's Show at Carlisle, 1880; first at Highland and Agricultural Society's Show at Glasgow in 1882, as sire of the best family of five aged animals exhibited; and first and champion cup at Highland and Agricultural Society's Show at Edinburgh in 1884."

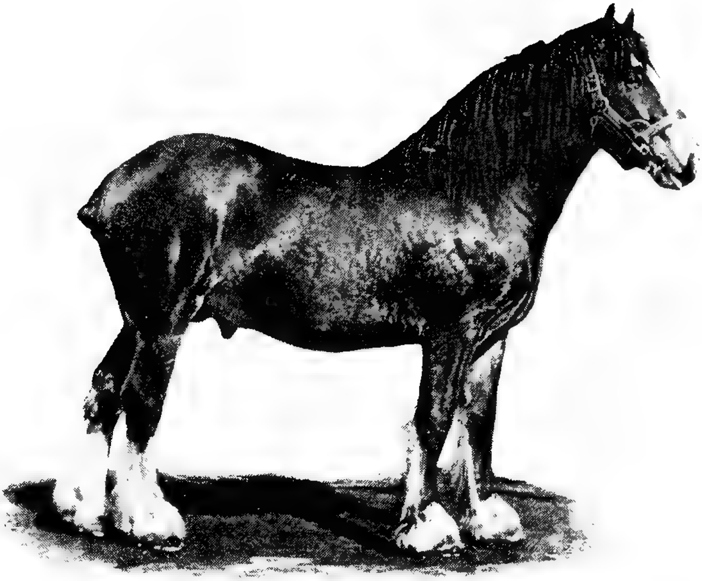


A.—CLYDESDALE STALLION, "DARNLEY," 222.
While the Property of DAVID RIDDELL, won the Highland Society and the Clydesda'e Horse Society Championships in 1884, &c.
Bred by Sir WM. STIRLING MAXWELL, Bart.

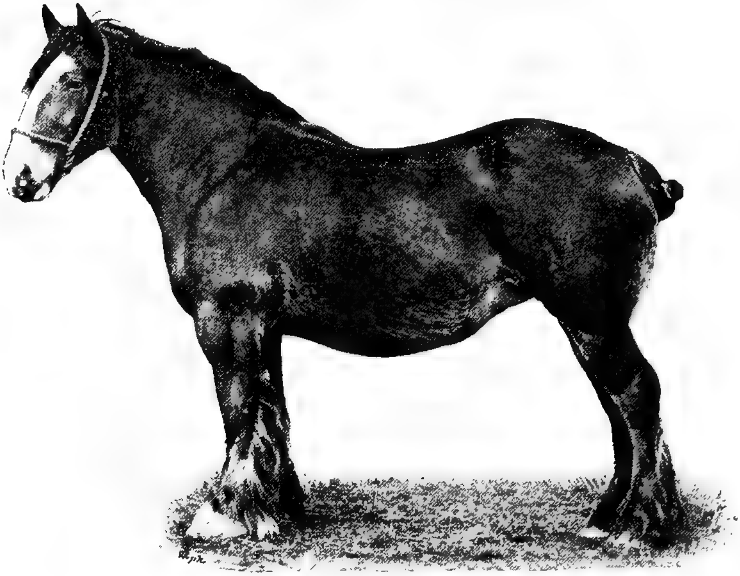


B.—CLYDESDALE STALLION, "THE PRINCE OF WALES," 673.
First at the Highland and Agricultural Society's Show, 1869; First at Kelso in 1872; First at the Royal Agricultural Society's Show, 1869.
For further particulars see page 184.

Plate XXXVIII.



A.—Clydesdale Stallion, "Prince of Albion," 6178, aged Two Years and Six Months.
The Property of John Gilmour, Montrave, Leven.



B.—Clydesdale Mare, "Moss Rose," 6203.
The Property of John Gilmour, Montrave, Leven.

Darnley was said to owe much to the wonderful quality of his dam. His chief defects were, he was light in the thigh, and he went a little "side-ways" both in walking and trotting. It has, nevertheless, been asserted that he was the best "walker" of any horse of his time despite the cast in his fore-feet.

The Prince of Albion (6178), for which J. Gilmour of Montrave is reported to have paid £3000, is by the mother's side related to Darnley, although he was sired by the Old Prince of Wales. The Macgregor (1487), and Flashwood (3604), two of the most celebrated horses of the present time, were got by Darnley.

The highest price, 1000 gs., ever paid for a two-year-old Clydesdale filly was given at Montrave sale in 1892 for an animal of the same fashionable blood, Montrave Rosea, the offspring of the two champions, Prince of Albion (6178) and Moss Rose (6203), shown in the accompanying plate.

Great credit was given to David Riddell for purchasing and retaining the Prince of Wales and Darnley for the benefit of the breed of horses in this country, at a time when high prices could be secured for such animals for exportation.

Characteristic Features and Points of the Breed.—Under this heading there appears the following suggestive paragraph in the historical and descriptive introduction in the "Retrospective Volume" of the Clydesdale stud-book:—

> "The oldest judges of Clydesdale horses in the Upper Ward of Lanarkshire, are of opinion that the Clydesdale horses of the present day differ little from those which were sold at Lanark and Rutherglen Fairs. Few of them will allow that they have been improved during the last 30 or 40 years; and many maintain that horses in old days were better furnished with bone, their legs better fringed with hair, and in general much sounder than those for which high prices have been paid during recent years."

As the highest Scottish veterinary authorities have expressed dissatisfaction with the regulations for the exclusion of unsound animals at shows, and the tendency to breed from lame horses, it is to be feared that those responsible for the safe keeping of the Clydesdale breed of horses have not in recent years been exercising a degree of vigilance in this matter, which can be at all favourably compared with the efficient supervision exercised by the guardians of the Shire breed over the borders.

Although the foreign demand, which resulted in a large number of high-priced horses being shipped abroad, has been suspended, yet the owner of a really good horse has great inducements offered to keep him in this country. For example, the Glasgow Society prize horse of the year 1889, Sir Everard (5353), may be calculated as follows to have earned £700 to his owner during the season—May, June, and July:—

The Society's premium, . . .	£150
Service fees of say 100 mares @ £3, . .	300
50 mares estimated to prove in foal, @ £5, .	250
	£700

The Prince of Carruchan (8151) would earn over £1200 for his owner, Peter Crawford, in 1892, with a covering-fee of £10, and an additional £5 on sight of a foal.

The exportation of so many entire horses has reduced the natural supply of the best kinds of dray horses in the market, and complaints are now made that certain classes of horses are only to be got with the greatest difficulty.

Points of a Clydesdale.

The *colour* is usually bay or dark brown, sometimes black or grey, more rarely chestnut or roan. The two last colours are regarded as indications of impurity of blood. The *height* averages about 16 hands in the case of mares, and 16·2 in that of horses; the *temper* should be mild, though the animal should nevertheless be possessed of plenty of muscular vigour and nervous energy; the *head*, medium size; the *jaw* broad but not too large or loaded with flesh; the *nose bones*, if not straight, slightly arched, not "dish-faced"; the *muzzle* not too refined or tapering; the *nostrils* wide; the *eye* bright and dark, full and vigorous, yet mild; the *forehead* full between the eyes and broad, tapering gradually upwards in the direction of the ears; the *ears* a good size, neither hanging, showing sluggishness, nor "prick-eared," but with frequent motion, indicative of a good disposition; the *neck*, medium in length and thickness and slightly arched in the male, and also in the female when she is in high condition; the *back* straight and broad, and not so long as to make it weak; the *tail* not too drooping; the *ribs* well sprung, round or barrel-like, the last one being a good length. Shortness in the posterior ribs is not an uncommon defect in Clydesdale horses, making them too light in the belly and leggy to appearance. The *hindquarters* long, well packed, and rounded; the *second thigh* well developed and broad; the *girth round the heart* good; the *body* is then deep, and the height of the animal greater than it looks; the *chest* broad and deep; the *shoulder* (*scapula*) closely knit at the top and oblique, though not necessarily quite so much so as in a hunter; the *humerus* should form a very obtuse angle with the *scapula*, else the animal cannot put its leg well forward in moving. [The position is indicated in Fig. 2, page 189, which, however, shows the *humerus* (*b*) to be rather too perpendicular; and that to be avoided where the horse stands over its forelegs in Fig. 1.*] The *forelegs* ought to be straight, not bending back at the knee—a defect described as "calf-kneed." This defect, however, minimises the bad results of short pasterns. The legs should also be strong, and not too far back under the body, showing that the humerus is rightly placed; the *knee-joints* broad and flat; the *muscle of the forearm* broad and well developed; the *shank bone of the forelegs* should present a flat side view, and should be thick and slightly rounded in front, tapering to an edge posteriorily, assuming a shape somewhat like a blunt razor, also short and clean (not knotty), but with plenty of substance; the *sinews* of the back of the leg thick, strong, and well defined; the *fetlocks* large; the *feathering*, or long-flowing silken hair on the back parts of the legs, neither deficient, too abundant, nor spreading round in front. If fine, long, and silky, it is an indication, along with a fine skin, of good breeding.

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* The figures are copied from a paper by the late James Howard, M.P., Bedford, in the "Journal of the Royal Agricultural Society of England" for 1884, who there first drew attention to the importance of the position of the *humerus* in the shoulder of a cart-horse.

White feet, though common, are objectionable, being frequently though not invariably softer than the others. They are now so prevalent among the best horses that some authorities go so far as to say that a white foot and sock are essentials in the pure Clydesdale.* The feet cannot be too large, if not thin and flat or " down in the soles." Too many stallions are lame from *laminitis*, or founder, induced by excessive feeding and insufficient exercise. A tendency in this direction seems to have established itself as hereditary in certain strains of blood.

The *fore and hind legs and feet* must be all set on straight, as they look better and are also stronger. It is less objectionable to have a toe pointed slightly in than out, when strength for work is the object. For exhibition purposes the opposite is the case, as an in-toed horse on being trotted for showing is apt to throw his feet outwards in

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* There is a prejudice against white feet among the natives in the Argentine Republic; and in the great draught-horse-breeding ranche of J. B. Haggin in California, Clydesdales cannot be reared owing to the liability of the white surfaces to be burnt by the sun, more particularly when the animals have access to water in which they can wet the parts referred to.

FIG. 1.

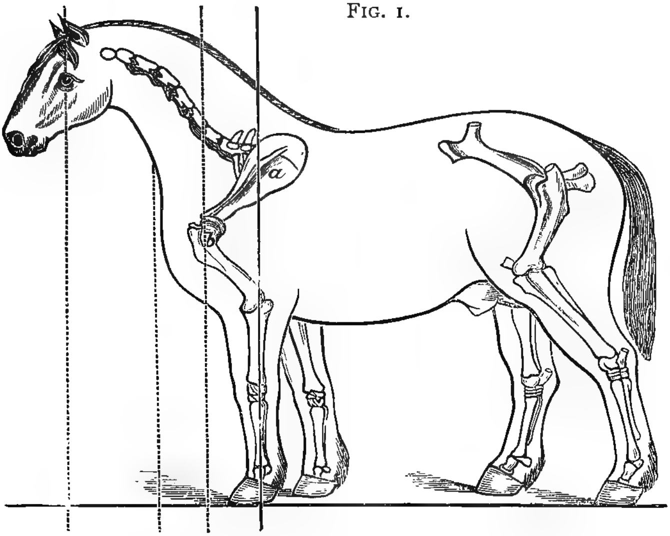
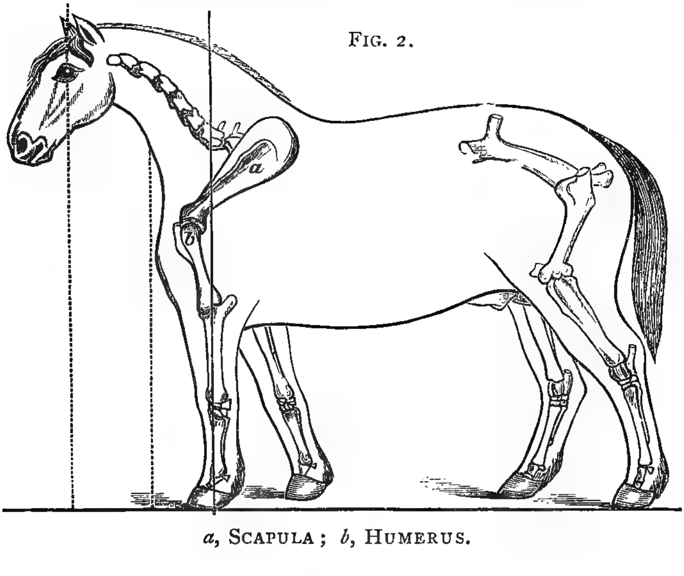


FIG. 2.



a, SCAPULA ; *b*, HUMERUS.

moving. The tendency then is to exaggerate the defect, whereas an out-toed horse when trotting "in a man's hand" shows to the best advantage.

The *houghs* should be broad in front and not too straight, else there is liability to thorough-pin, and not too crooked, as they do not look well although they are strong. Any defect in a hough constitutes unsoundness.

The *pasterns* ought to be medium in length, so as to give the necessary elasticity to counteract the concussions caused by the characteristically quick firm step. If long, they are weak; if short and upright, they are more liable to bony exostoses. Splints often appear in this breed without producing lameness or unsoundness.

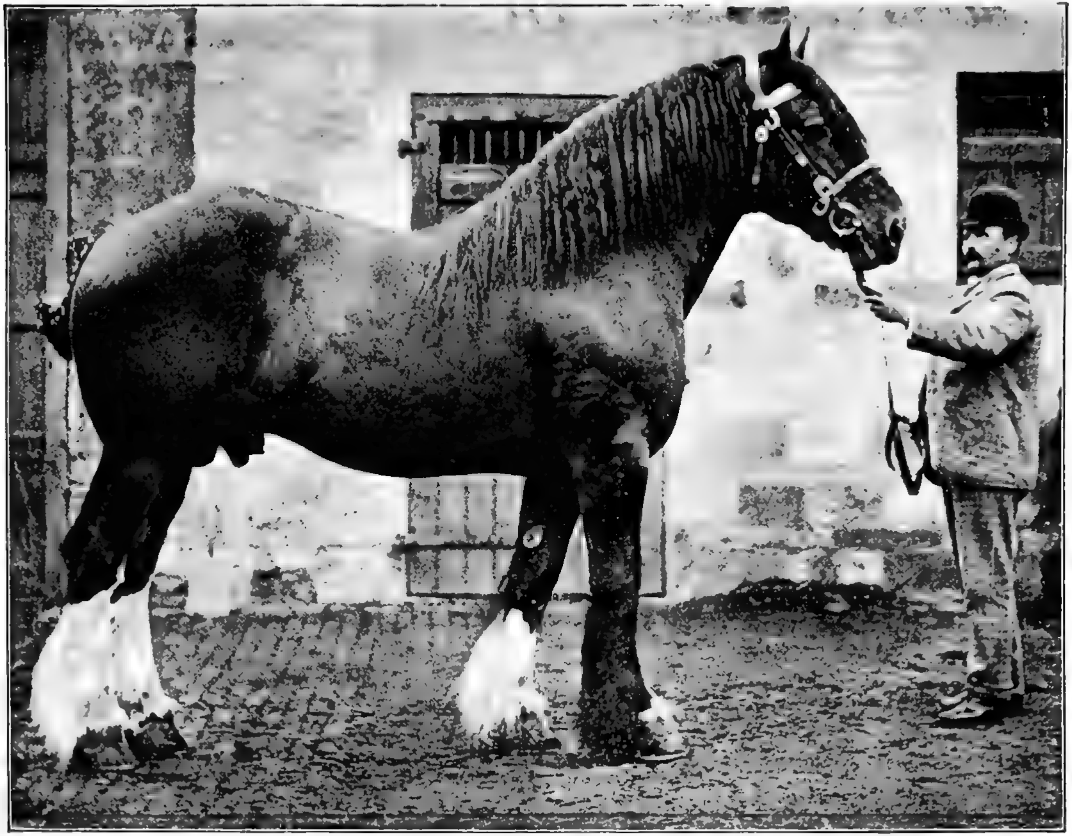
The *action* is quite peculiar, being very free and active, and the *step* long and measured; the animal walking, when unloaded, four miles an hour. Young horses will at times surpass this rate, but for an ordinary work horse it is quick enough.

The *sole* should be almost inverted each time it is lifted in either trotting or walking; the *movements* of the limbs free and ample at both knees and houghs, and straight forward. The swinging or twisting out of the fore-feet, and the side-ways cow-like motion of the hind legs, are equally objectionable.

THE SHIRE HORSE

Is the largest British breed of horses. The larger sorts, bred in the Fen country, are better suited to dray-work than to agricultural work. The points of the best specimens are very much like those of the Clydesdale horse. The ordinary varieties of the two breeds differ more in appearance than the better sorts, which, as has been explained, are probably more closely related than farmers generally suppose. The late Lawrence Drew believed in crossing Clydesdales with good Shire horses, as among the resulting

PLATE XXXIX.

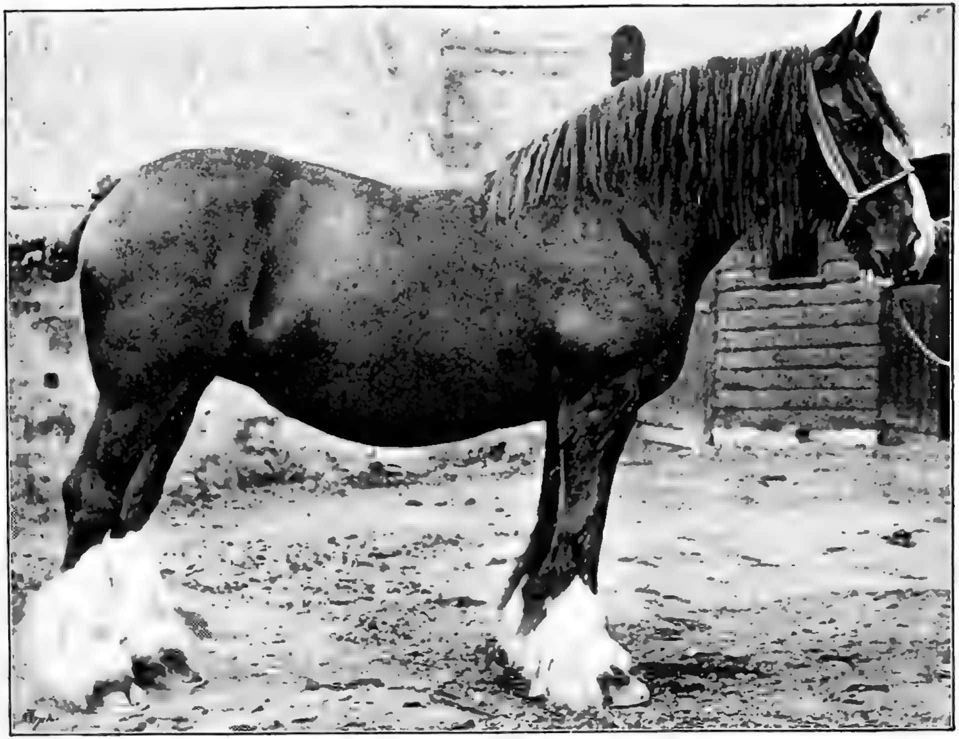


SHIRE STALLION, "HITCHIN CONQUERER," 4452.

Champion at the London Shire Horse Show, and sire of many first-rate animals, including "Mars Victor," sold for 1500 guineas; "I'm the Sort II.," for 1000 guineas; "Magog," for 1000 guineas; and "Extraordinary," for which was refused 1000 guineas.

The Property of A. B. FREEMAN MITFORD, C.B., M.P., Batsford Park, Moreton-in-the-Marsh, Gloucestershire.

PLATE XL.

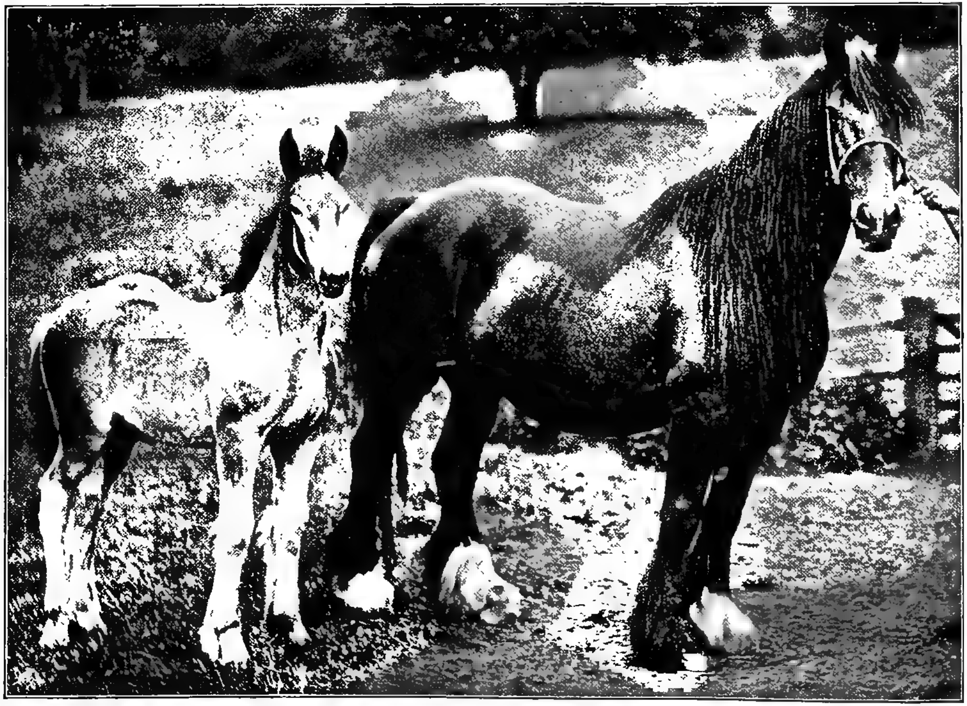


Shire Mare "Chance."

With an unbeaten record in the Showyard, finishing by taking the Queen's Gold Medal at Windsor

The Property of A. B. Freeman Mitford, C.B., M.P., Batsford Park, Moreton-in-the-Marsh, Gloucestershire.

PLATE



SHIRE MARE, "LOCKINGTON BEAUTY," AND FOAL, "MERVEILLE.

"The most extraordinarily successful brood mare yet known to the shire world."—*L.S.J.*

The Property of A. B. FREEMAN MITFORD, C.B., M.P., Batsford Park, Moreton-in-the-Marsh, Gloucestershire.

advantages it remedied two of the greatest defects of the Clydesdale, viz., the want of size, and the want of depth of rib or body. Such a practice is quite in accordance with the best usages in the improvement of all breeds, whether equine or bovine. The fact that it has been practised on a considerable scale for many years explains why it may be continued with advantage, as the results will not be those that follow crossing between two distinct breeds.

The differences in the *ordinary work-a-day* form of Shire horse as compared with the common Clydesdale are :—

Lower and more sluggish *action;* the *ends* bulky; the *belly* or middle larger (the animal being a greater feeder); the *quarters* shorter (more like the Belgian horse), and the *plates* consequently steeper and flatter; the *houghs* wider between than in the Clydesdale, in which they usually incline slightly inwards; the *leg-bones* rougher and not so straight; the *pasterns* shorter, and the *hoofs* more upright, giving a stilted look. Long pasterns are now sought for in the best horses, no doubt to counteract the general weakness in this point. The *space between the eyes* is frequently not so wide, and the *eyes* are not so prominent as in the Clydesdale. Roans and chestnut *colours* are more prevalent among Shire than among Clydesdales. There is more long hair or feathering on the back parts of the legs: this also extends round in front, and includes a tassel from the knee of the stallion. James Howard's paper in the Royal Agricultural Society's Journal for 1884 points to much hair as a defect, being more or less detrimental to the animal in certain kinds of work, and especially so in a heavy-land district.

Names and History.—The Shire horse or its prototype, we are told by Walter Gilbey in his handsome little volume "*The Old English War Horse*,"* was written of a thousand years ago as "The Great Horse." It has been subsequently named the "War Horse," "Old English Blac Horse," and the "Strong Horse."

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* Vinton & Co., 9 New Bridge Street, London.

It is within comparatively recent times that horses have all but supplanted bullocks in the working of land, the original object of the English horse being as a help in times of war. Cæsar's account of it shows that even at that early date the breed was maintained in a high state of proficiency, not only as regards physical form and quality, but also in the matter of training. At a later period it was necessary to maintain the size and strength of the war horse, to enable the animal to carry the heavy plate-armour of the mounted soldiers of the time. To the efforts made to attain this object we are indebted for the massive frames and powerful limbs of the Shire horse of to-day.

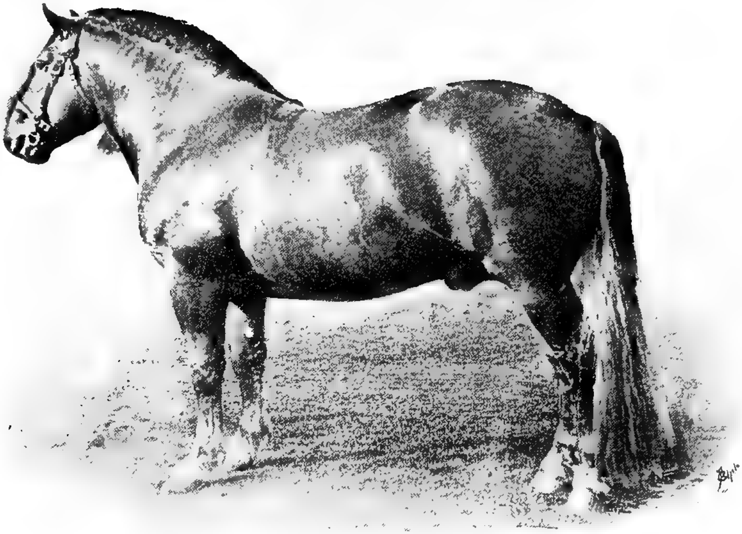
Records exist, dated 1160, of the importation of horses with the object of improving the native horse of ancient Britain. Walter Gilbey says in this connection:—

> "During the reign of King John—1199 to 1216—there exist distinct particulars of the importation into England, from the low lands of Flanders, Holland, and the banks of the Elbe, of a hundred stallions of large stature; and it is from the blending, nearly 700 years ago, of these animals with the English breed, that some strains at least of our heavy draught horses must be said to date their origin."

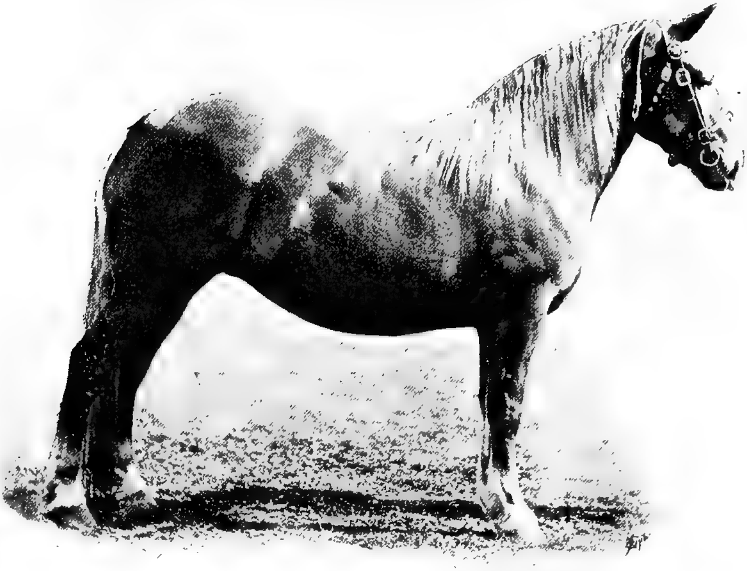
He further points out that the so-called "Shire" horse, because belonging to the *Shire* counties in the middle of England,—

> "Has for centuries, beyond a doubt, been distributed in numbers through the district between the Humber and the Cam, occupying the rich fen lands of Lincoln and Cambridgeshire, and extending westward through the counties" (*shires*) "of Huntingdon, Northampton, Leicester, Nottingham, Derby, Warwick, and Stafford, on to the Severn."

The Shire Horse Society, and the Shire Horse **Stud-Book,** dating back to almost 1878, have done much for



A.—SUFFOLK PUNCH STALLION, "WEDGEWOOD," 1749.
Queen's Gold Medal and Champion Prize as the best Suffolk Stallion at Windsor Royal Show, 1889.
The Property of ALFRED J. SMITH, Rendlesham, Woodbridge, Suffolk.



B.—SUFFOLK PUNCH FILLY, "QUEEN OF TRUMPS," 2702.
First Prize (£15), Royal Agricultural Society's Show, Warwick, 1892.
The Property of THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park.

the advancement of the breed. The extensive foreign demand for Shire horses to go to Germany and America encouraged breeding in this country by advancing prices.

THE SUFFOLK PUNCH

Is named from its county, and from its compact and rounded form. The colours are chestnut (dark and light), and more rarely iron-grey or sorrel. It is said that the colour was derived through a cross with imported Norwegian horses, brought, like certain of the progenitors of the trotting hackneys, by the early Norse invaders. The form and action of certain of the Norfolk hackneys of the day leave no reasonable grounds for doubting that however the Norfolk trotter and Suffolk Punch may now differ in size, style, and general appearance, they must have been intimately connected with one another at some distant period.

Arthur Young, writing in the end of last century, mentions the Suffolk Punch as being one of two pure-bred varieties of cart-horses—the large black, or old English horse, being the other. The body looks much too heavy for the limbs, which are clean and fine, with little long hair. The back is at times hollow, but this allows of a finer style of neck and shoulder. Suffolks are slower in their movements than Clydesdales, and twist their legs and feet more when moving. At one time they were flat-footed, and liable to become lame if worked regularly on the hard road or on stone pavements, but the care bestowed on breeding has in recent years eliminated this defect among animals of the first rank. They are steady pullers, and suited alike to farm and dray work.

CHAPTER XIV.—THE HORSE—THE THOROUGHBRED, HACKNEY, CLEVELAND BAY, YORKSHIRE COACH-HORSE, AMERICAN TROTTER, THE ASS, AND THE MULE.

The Thoroughbred—Racecourse and other Selection—Early Improvement—Importation of Roman, Spanish, Arabian, and other Horses—Failure of Early Crosses—In-and-in-Breeding—The Hackney—Origin and Development—The Modern Norfolk Trotter—The Original Trotter—Yorkshire Trotters—The Exportation of Hackneys—The Cleveland Bay—The Yorkshire Coach-Horse—The American Trotting Horse—The Ass—The Mule.

THE THOROUGHBRED*

IS in some respects perhaps the most interesting of our British live stock. It has been bred without admixture of alien blood for more than a hundred years, and during that time it has been subjected to the most rigorous system of selection through individual trials of strength and endurance. No breed has been so effectually tested for the special qualities required of it as the thoroughbred. The show-yard test of the cart-horse is very different from this test. The merits in a show competition are determined by external appearance and by inference, not by trial in the work for which the animals ought to be most prized. The endeavour to judge the qualities of a thoroughbred by external appearances only ends in failure and disappointment in most instances, even when this is attempted by the most skilled. An additional

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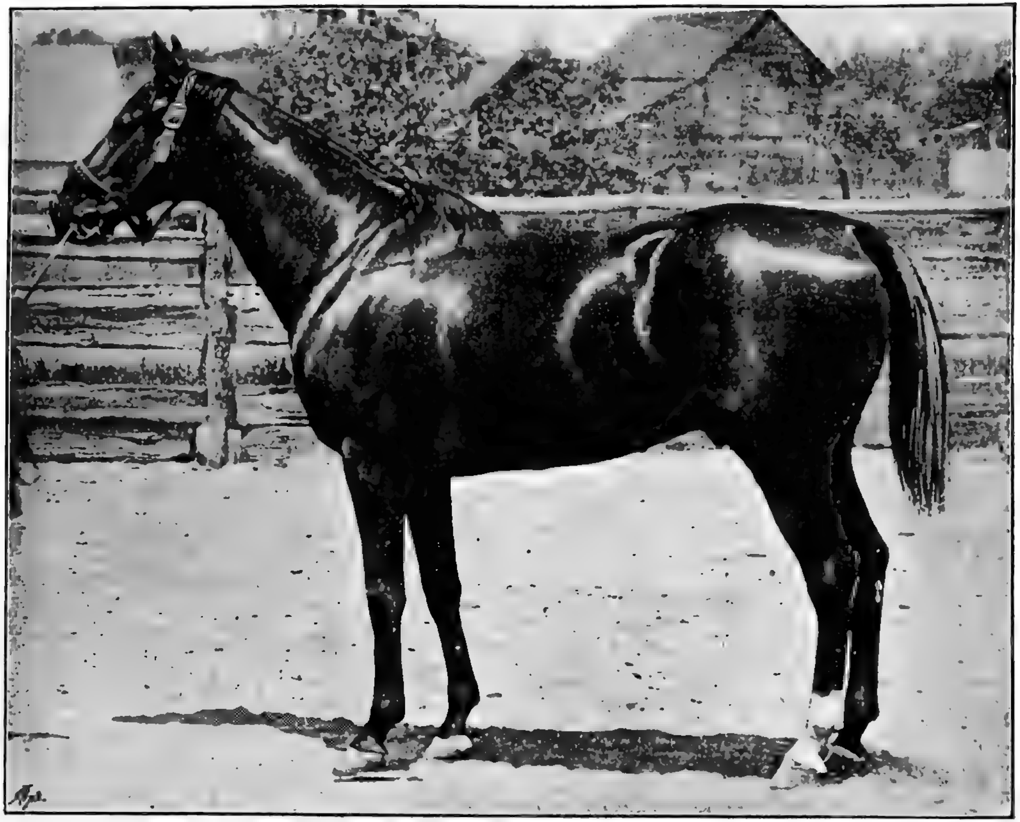
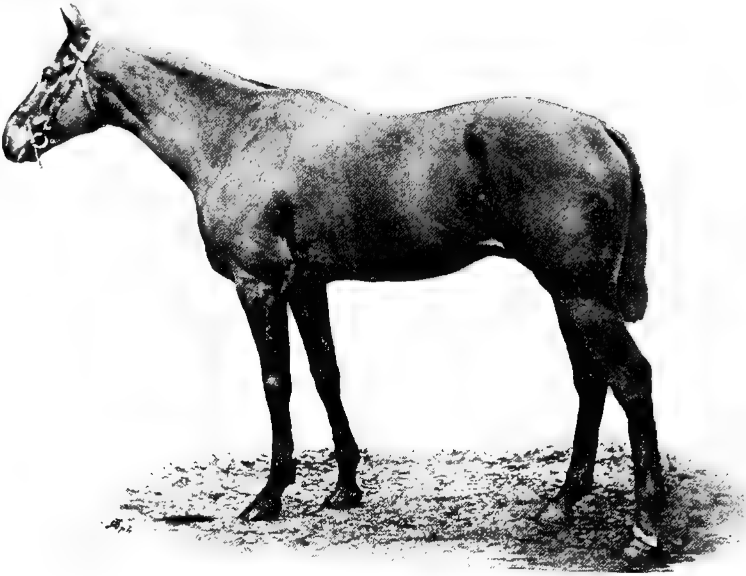
* One of the most valuable and practical works on this breed is that by Wm. Day, of Salisbury, "The Horse: How to Breed and Rear Him," Bentley & Sons, 1888, to which the Author acknowledges indebtedness.

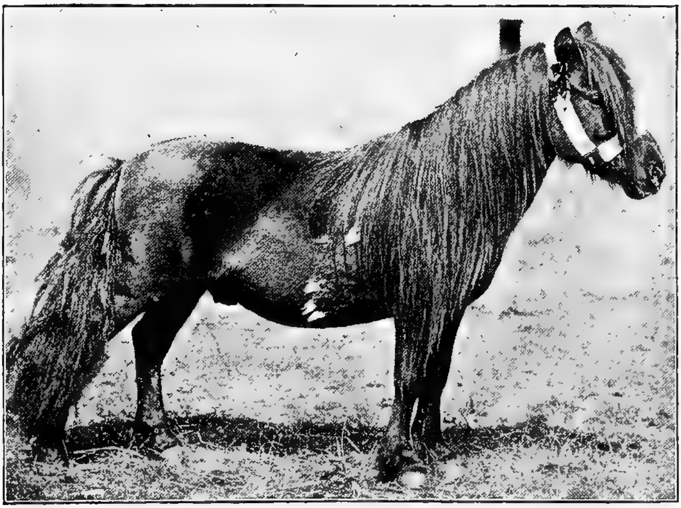
PLATE XLIII.



THOROUGHBRED HORSE, "GRAND FLAMEUR,"
Which belonged to the late ANDREW TOWNE, and started in nine principal races in Australia, and



A.—THOROUGHBRED HORSE, "FOXHALL."
Winner of the Grand Prix de Paris, the Ascot Cup, the Cæserwitch, and Cambridgeshire Stakes, &c.
Bred in America, and got by "King Alfonso," by "Phaeton," son of "Stockwell," out of "Jamaica."



B.—SHETLAND PONY STALLION, "LAIRD OF NOSS," 20.
First at the Highland and Agricultural Show at Inverness, 1892.
The Property of THE MARQUIS OF LONDONDERRY, Seaham Hall, Seaham Harbour.

RY, Seaham Hall, Seaham Harbour.
RY, Seaham Hall, Seaham Harbour.

selection over and above this process of natural selection is apparently necessary, when we realise that since 1877 the Derby has been won on five occasions by an unsound animal. Records exist of racing in this country as far back as the beginning of the 13th century.

Of the early improvement and management of British horses little is known with certainty. After the formation of good roads the Romans imported horses of lighter build than the native English horses, with the object of improving the latter for road-work. Athelstan introduced running horses from Germany. Spanish horses were next used before Arabians were imported. What were called the "Royal mares" were imported by Charles II. About the end of the 17th and beginning of the 18th century the most famous of the Eastern sires were introduced, viz., the *Godolphin Arabian*, *Byerly Turk*, and the *Darley Arabian*. These horses mated with the Royal mares, and with the best of the native English horses of the time acquired a very large share in the establishment of the English thoroughbred. Going still more closely into the origin of the best thoroughbred horses of the present day, it will be found that nearly all can claim relationship with one or other of the three famous sires—*Herod*, *Eclipse*, and *Matchem*.

The superior qualities of the few have been taken advantage of in the improvement of the many. The improvement has been great in the special direction and for the special purpose for which the racehorse is kept. It is true that the length of a race, which in olden times extended over three or four miles, has now been much shortened, and horses are trained to do short distances at high speed; but there little doubt, nevertheless, that the staying power of the breed is as good as ever, while the pace in later years has greatly increased.

The first or early crosses with Turkish, Arabian, or

Barb horses did not prove a success as regards the production of winners, but the improvement due to the impetus given by the cross became distinctly apparent in later crosses, and appeared after a time in the form of animals superior to either the Arab or the English horse prior to that time. Though this is admitted, no advantage could now be gained by crossing with Arabs. These are supposed to have remained at much the same stage of advancement for the last two hundred years, while the English thoroughbred has been greatly improved. The differences between the two breeds are now too great for a cross to "nick" satisfactorily.

In-and-in-breeding, apart from that modified form of in-breeding which has been defined "line-breeding," being derogatory to pluck, is not successful in the thoroughbred; but there is no breed wherein the advantages of a good pedigree are more invariably seen.

The Royal Commission on Horse-breeding.*—In the year 1888, certain money, which was formerly given in Queen's plates for racing, was first diverted by the Royal Commission on Horse-breeding to the encouragement of horse-breeding in Great Britain. A show of thorough-bred stallions suitable for getting half-bred horses is annually held in March at the Royal Agricultural Hall, Islington, in connection with the Royal Agricultural Society of England and the Hunters' Improvement and Hackney Horse Societies, for the purpose of selecting the best horses entered for the various districts. In 1892, twenty-two "Queen's Premiums" of £200 each were offered for stallions of four years old and upwards, and these were distributed in six districts in England—three in each—and four districts in Scotland—one in each.

The Royal Agricultural Society of England provided three additional stallions for another district of England, making with the six districts already referred to the seven produce districts into which the country has been divided in connection with the annual agricultural returns. Notice was given in 1892 that the Society would no longer contribute funds to help in this work, but that the Commission on Horse-breeding must bear the whole expense. All stallions are rejected if not found on inspection to be free from—

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* Secretary—J. Herbert Taylor, 5 Gt. George St., Westminster, S.W.

Roaring or whistling.
Ringbone.
Unsound-feet.
Navicular Disease.
Spavin.
Cataract.

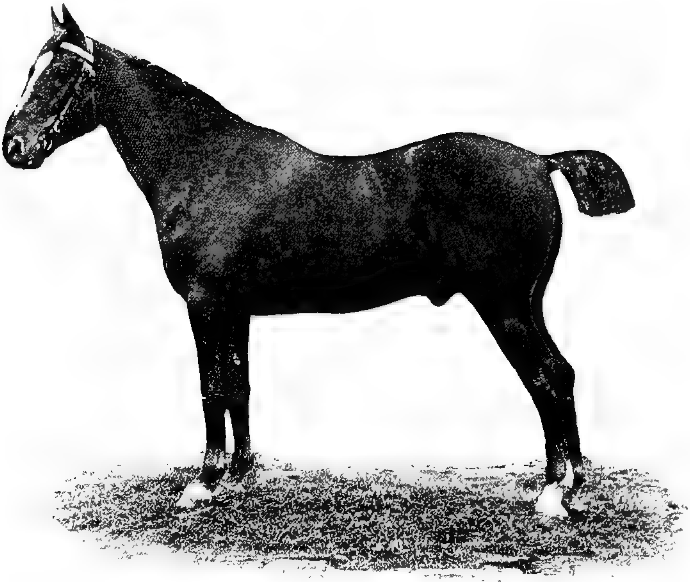
Each stallion is expected to serve at least fifty mares (if required) in the season, at a fee of £2 for each mare, and 2s. 6d. to the groom.

The average percentage of foals left is about or a little over sixty.

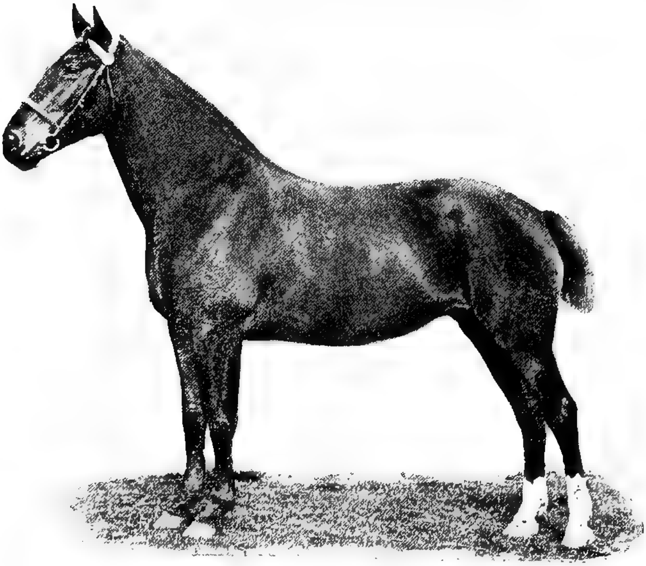
Though the horses got by the thoroughbred stallions from half-bred mares form an excellent class of animals, it is a question if the ultimate result will prove satisfactory when the mares in the country are more nearly thoroughbred. It is safe to predict that the time will come, and that soon, when there will be a demand for more bone and greater massiveness than the thoroughbred can supply. Moreover, if the breeding of half-bred horses is encouraged by the work of the Commission, the extension of other breeds, such as the Cleveland and Yorkshire coaching-horse, which are used for similar purposes as half-breds, must to some extent be discouraged.

It must not be forgotten that the produce of the Queen's Premium stallions, however excellent in themselves, are only cross-bred animals, which will require to be mated for breeding purposes with the greatest care. So far the Commission has had nothing but unqualified success to report, which has fortified it to ask for a more liberal supply of funds from the public purse, but the critical time when genuine skill will be required has yet to come. It was a judicious act to discontinue the payment for racing purposes of the sum of £3,360, which was formerly given from Her Majesty's Privy Purse for Queen's plates, as the sum was much too small to encourage first class racing. It is questionable, to say the least of it, whether it was right to give for the encouragement of horse-breeding such a paltry sum, even when increased as it was by a Parliamentary vote of £1,740 per annum. If it is a wise policy to encourage horse-breeding by State aid, the money thus devoted to it is altogether inadequate. If a larger sum is ultimately provided, the Commission will naturally be requested to take a more comprehensive view of the situation, and to extend encouragement to other breeds than the thoroughbred. A Parliamentary blue-book of 138 pages, containing the minutes of evidence taken before the Royal Commission on Horse-breeding, was published in 1890, and progress reports will no doubt be issued annually.

The efforts to improve the breed of light-legged horses is not confined to England and Scotland. "The Royal Dublin Society issued in 1892 the first volume of its register of thoroughbred stallions for service under the horse-breeding scheme of 1892. The conditions are that the stallion shall be entered in Weatherby's stud-book, shall be over three and not over eighteen years of age, shall by the society's veterinary surgeons be declared free from all hereditary diseases, and shall in other respects be considered suitable for the objects of the horse-breeding scheme. In all, applications were received for 147 stallions, of which 29 failed to pass the veterinary inspection, 17 were rejected for other reasons, and 101 were registered. Under the scheme for the distribution of £3,200 for the improvement of the breed of horses, the mares of farmers whose holdings are less than £150 a year tenement valuation are nominated to these stallions in their respective counties, two-thirds of the fee of £3 being paid by Government."

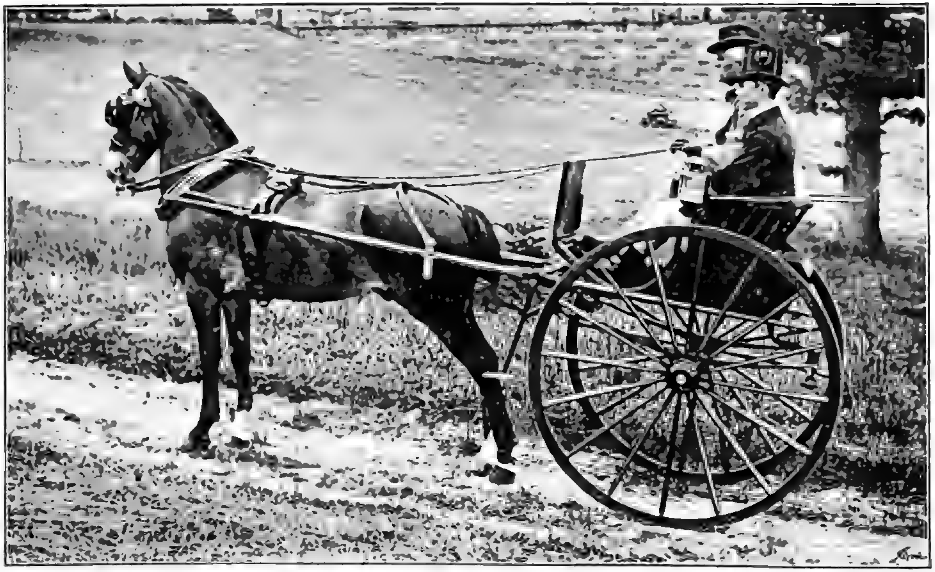


A.—HACKNEY STALLION, "RUFUS," 1343.
Champion of the Hackney Show, London, 1889.
The Property of HENRY MOORE, Burn Butts, Cranswick, Hull.



B.—HACKNEY MARE, "LADYBIRD," 177.
Winner of many Prizes.
Owned by J. A. MATHER, Thornhill, N.B.

PLATE XLVI



HACKNEY (in 2-wheel cart)

THE HACKNEY OR "NORFOLK TROTTER" BREED

Is said by Lawrence to have sprung on one side of its ancestral descent from the Norwegian horse. It is consequently found in Norfolk and Yorkshire, where the Norse invaders had their principal strongholds in this country. The peculiarity of its action, as indicated by its name, is the most important difference between the hackney of the present day and the thoroughbred. They have been freely crossed by imported horses from the same foreign stocks. The form, however, has also differentiated with difference in surroundings, and the difference in the objects in view held by their breeders. It is to the original native mares in each case that the trotting habit of the one and the galloping habit of the other are due.

The modern Norfolk trotter was remodelled from the earlier trotter of Norfolk and the fen country about the end of last century by the use of Shales' or Shield's horse, or Scott Shales (692), which infused much of the thoroughbred Arab and Barb blood, and gave fine bones, pace, and staying power to the heavy, round-boned, and more or less cart-horse-shaped trotter of the beginning and middle of the century.

The original trotter varied in size from the farmer's market cob to the regular cart-horse of the country, to which the Suffolk Punch is no doubt directly related. There are no reasonable grounds to doubt that the free action of many of our cart-horses and the action of the hackney had a common origin in an early British horse. It was at one time a custom in Norfolk to trot the cart-horses when returning with the empty cart or waggon,—a fact which indicates that they were at one time lighter and more active than those of the present day. Their increase in weight can, however, be accounted for by the crossing which took place between the original breed (described as "small, brown-muzzled, and light-boned") and Lincolnshire and Leicestershire black horses.

Among the **Yorkshire trotters** the same process of improvement was carried out about the same period. Thoroughbred Arabian blood was largely used through the employment of a good horse named "Sportsman" and his descendants. It is owing to the presence of an abundance of Arab blood in the hackneys of Yorkshire and of Norfolk that it is now possible to cross the two varieties with satisfactory results, and to maintain them as they now exist in the same stud-book. At an earlier date, but so late as 1775, crossing in this way was not advisable, as it is recorded* in reference to Norfolk horses, that "not a single horse of any repute has been produced from these half-bred horses brought from Yorkshire or elsewhere."

Hackneys have been largely **exported** to all parts of the world, and in recent times have been taken to India as stud horses† for breeding army remounts by the native horses. The Yorkshire variety seems to possess the necessary qualities for the purpose in a greater degree than the Norfolk.

There is a considerable demand for active Polo-ponies at good prices, not only at home but at all stations where British troops are stationed, the game being recognised as important in the interests of good horsemanship. The circular issued (1892) by Lord Roberts, the Commander-in-chief in India, recommending officers to use only ponies of 13.3 hands high, will give an impetus to the breeding of animals of medium size.

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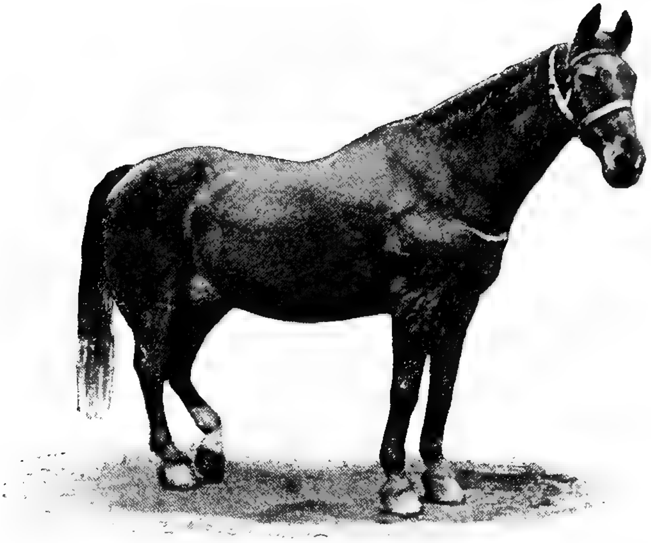
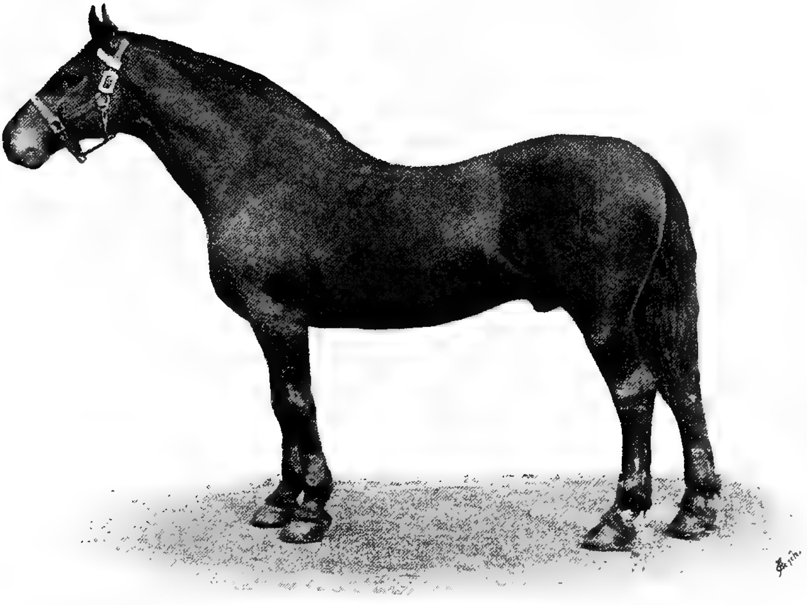
* In the first volume of the Hackney Stud-Book, 1884, to which the Author is indebted for many details of the early history.

† The Report (1892) announcing the transference of the management of horse-breeding operations from the military to the civil authorities, says:—"The stallions at the end of the year numbered 367, Norfolk trotters being most numerous, and most popular with native breeders. An improvement in horse-breeding is noticed."

Plate XLVII.



A.—Half-Bred Gelding, at Fifty Years of age.
Belonged to S. F. Petrie, Leith.



B.—Cleveland Bay Horse, "Fidius Dius."
The Property of H. V. Webster, Northallerton.

THE CLEVELAND BAY,

A branch of the **old coaching or chapman horse,** is now mainly to be seen in Yorkshire, although at one time its habitat covered a much wider region. The breed was in a most flourishing condition for about two decades subsequent to the middle of last century, after which period it declined. It, however, sustained its worst blow at the time when railways caused the reduction of the demand for stage-coach horses, and when it became fashionable to breed carriage horses and other light-legged horses by mating a thoroughbred horse with a light farm mare. By this means also the breed became stained to some extent by the introduction of foreign blood. Within recent years much greater attention has been paid to the preservation and improvement of the breed. The Stud-Book—the first volume of which was published in 1884—has proved a distinct source of interest, and a means by which the best qualities of the original breed may yet be brought prominently to the front. There is a tendency—due, it is said, to in-breeding, but no doubt also to the thoroughbred cross—to a lighter condition of bone than that natural to the old form of the breed.

Descent is claimed for the Cleveland from the war horse and Cæsar's account of the use of chariots in war by the ancient Britons is quoted as referring to it. Those who are interested in the Shire horse are equally certain that the passage refers to that breed. The probability is that both claims are equally well founded, and that the differences which now exist, admitting that they are great, have been produced since Cæsar's time by "crossing" in different directions and with different objects in view.

Loyd's description of the Cleveland horse, quoted from the Cleveland Stud-Book, says:—

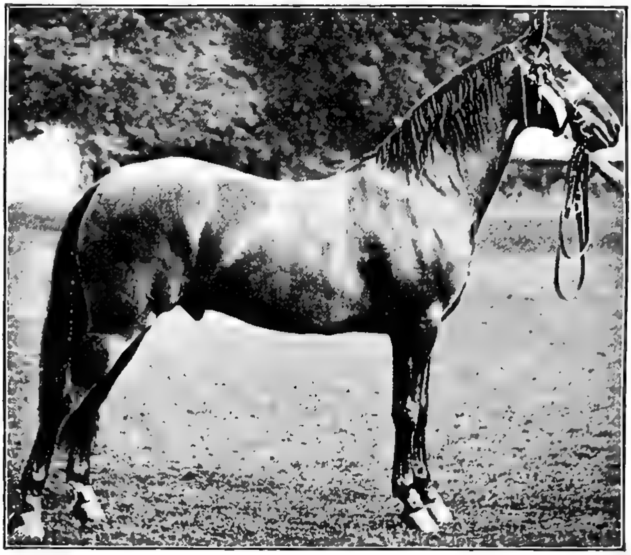
"From 16 hands 1 in. to 16 h. 2½ in. in height, he should be possessed of good, sloping shoulders, a short back, powerful loins, and long quarters. His head is rather plain than otherwise, and on the large side, but it is well carried, and his general appearance denotes activity and strength combined in a manner not seen in any other breed. His action is not remarkably high, but it is the kind of action for getting over the ground. In colour he is bay—either light or dark—with black legs, clear of hair; and black zebra-like stripes on the arm and above the hock are sometimes seen. These are known as the black points, and are supposed to denote special purity of breeding. White, save a small star or a few white hairs in the heel, is not admissible, a blaze or a white foot proclaiming at once the admixture of foreign blood."

The Stud-Book points out that nearly every horse of note belongs to one or other of three great families,—the descendants of Dart (83), Barley Harvest (447), and The Hob Horse (316). Those who have carefully followed the previously detailed histories of many other breeds of live stock, will remember that this is in no way an unusual circumstance, but is, on the contrary, one of frequent occurrence.

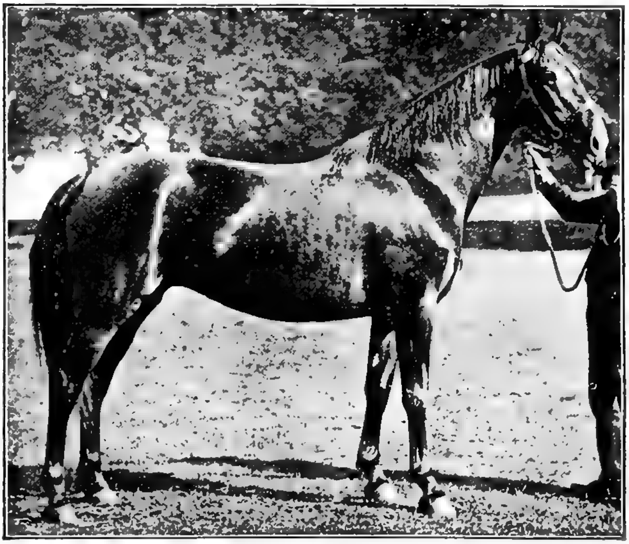
THE YORKSHIRE COACH-HORSE,

From the North and East Ridings of Yorkshire, is a breed of more recent formation than the Cleveland. The following quotations from the preface of the Yorkshire Coach-Horse Stud-Book, 1887, indicates in a few words its recent origin and general characteristics :—

" It cannot be claimed for the Yorkshire coach-horse that he is a pure-bred animal, but that on the contrary, by the judicious crossing of large-sized good-coloured mares with stallions altogether or nearly thoroughbred, a class of horses has been produced suited to the wants and circumstances of the times. By universal consent the colour should be bay or brown, with black eyes, mane and tail abundant but not curly, the height from sixteen hands to sixteen hands two inches, with fine head, sloping shoulders, strong loins, and lengthy quarters, high-stepping action, good sound feet, flat legs, and abundance of bone and muscle."



A.—COACHING STALLION, "SALISBURY," 1888, Y.C.S B.
First Prize, Royal Agricultural Society's Show, Warwick, 1892.
The Property of THOMAS CARR, Kirk Smeaton, Pontefract.



B.—COACHING MARE, "WATH BELLE," 338, Y.C.S.B.
First Prize, Royal Agricultural Society's Show, Warwick, 1892.
The Property of T. RADCLIFFE CHURCH, Aston Manor, Newport, Salop.

The coach-horse has rightly or wrongly been described as an improved Cleveland. Springing from the same county, there are good grounds for believing that the two breeds are related through some of their progenitors. The high action of the coach-horse would indicate that it may in the same way claim kindred with the breed of trotting horses which has aided in making Yorkshire famous as a horse-breeding county.

It is an established fact that much of the "quality" of the coach-horse has been derived from the fountainhead of "quality," the English "thoroughbred," and from the breeds from which the thoroughbred was formed. On this point the preface already quoted says:—

> "Amongst the oldest noted sires of celebrated coach-horses is Dunsley's Dart, descended on his sire's side from Darley's Arabian. Dunsley's Dart was the grandsire of Agar's Dart, the sire of Rainbow, afterwards called King George IV., sold to Robert Thomas, of Eryholme, Darlington, when seventeen years old, for £300." "Harpham Twak, said to be a small horse not more than 15.1, was a full-blood horse, his dam's sire going back to the Darley Arabian." "Sawden's Active was by Jalap, by Regulus, the winner of seven Royal plates in one year; whilst Lamplough's Victory, from whom a host claims descent, appears by conclusive evidence to have been sired by Trotting Jalap, a son of Old Jalap, which horse is recorded in the Racing Stud-Book as foaled in 1758." "The dam of King William (245), a horse which was in service in 1840, was by Brutandorf, and grandam by Old Sandbeck, both recorded as full-blood horses, Sandbeck being the sire of Barbell, the dam of Flying Dutchman."

The performances of the breed in the old coaching-days are also worthy of notice:—

> "Of the speed, power, and endurance of these horses, we have recorded that Dreadnought, by Old Clothier, won a trotting match for £100, carrying 16 stones 16 miles within the hour; Wonderful, a horse that obtained a high premium at Ripon Show in 1819, had a brother, Peirson's Plato, that trotted 18 miles within the hour, carrying 18 stones; and Bevas Pullen's King William trotted a mile in three minutes at Selby, carrying 14 stones."

Like all breeds into which foreign blood has recently been introduced, the coaching-horse cannot always be relied upon to breed true to type; but the large proportion of "blood" present in the best specimens minimises this drawback, and time, with the careful breeding now being followed will efface it entirely.

THE AMERICAN TROTTER.*

In view of the facts that the greatest progenitors of the breed were of British descent, and that trotting horses are rapidly becoming fashionable not only in this country but on the Continent of Europe, no apology is necessary for introducing a brief account of the "National Horse of America" in a book relating to British Live Stock.

Public interest is divided among the three most noted breeds of trotters—our own Hackney or Norfolk trotter, the American trotter, and the Orloff or Russian trotter. Of these the American horse is considerably the fastest. The best records of the Orloff do not come within the 2:30 record, while the Hackney has been bred more for showy action than for pace. It has been well remarked, in considering the different objects for which trotters are bred, that the aim of the American horse is to create interest by getting as quickly out of sight as possible, while the Hackney strives to attain the same object by keeping within view, and covering as little ground as possible.

John Henry Wallace, founder and compiler of the *American Trotting Register*, begun about 1865, and the first volume containing 3,000 entries published in 1868, may be said to have laid the foundations from which the "Standard trotter" has been evolved. Wallace laid down the principle that "speed will most probably breed speed," and thus made the test of actual performance the basis upon which animals were admitted to registration in the *American Trotting Register*,* which, till recently sold to a syndicate, along with the *Year Book* and *Wallace's Monthly*, for 130,000 dollars, remained his own property. Since Wallace so successfully took the matter of registration in hand, the record (per mile in minutes and seconds) has been reduced from 2:40 to 2:04, and it is fully expected that America will produce a horse that will trot a mile in two minutes, or at the rate of thirty miles an hour.

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* See an article on the origin and history of this breed, under the title of "The National Horse of America," in the 1887 report of the U.S. Department of Agriculture, by Leslie E. Macleod, Associate Editor of *Wallace's Monthly*. To this article, and to his friend and kinsman Henry Wallace, Editor of *The Iowa Homestead*, Des Moines, Iowa, the Author acknowledges indebtedness

The following **rules** which come into force in April 8, 1893, explain the meaning of the term "Standard trotter":—

1. Any stallion that has a record of 2:30 or better, provided two of his get have records of 2:20 or better, and provided his sire or dam is already a standard animal.
2. Any mare or gelding that has a record of 2:25 or better.
3. Any mare that has a record of 2:30, provided her sire is standard and her dam is by a standard horse.
4. Any stallion that is the sire of four animals with records of 2:30 or better, or the sire of three with records of 2:25 or better, or two with records of 2:20 or better.
5. Any mare that has produced an animal with a record of 2:25, or two with records of 2:30 or better.
6. The progeny of a standard horse when out of a standard mare.
7. Any mare whose sire is standard, and whose first and second dams are by standard horses.

The rack or pacing action,† which involves the lifting of the hind- and the fore-foot on the same side at the same time (giving origin to the name "side-wheeler"), in place of the fore- and the hind-foot on opposite sides as in trotting, is a natural movement which may appear in the progeny of a noted trotting family in the same way that a famous pacing sire or dam may produce a horse which assumes the trotting rather than the pacing gait.

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* In 1892 it embraced ten volumes, and registered 60,000 animals.

† *Vide* Appendix D for illustrations by Eadweard Muybridge on animal locomotion.

In future the pacing standard will be the same as the trotting standard detailed above, but pacing horses will be entered in a separate section of the "Record." Pacing may be regarded as kindred to and intermediate between trotting and galloping. The best pacing records are on the whole still slightly in advance of the corresponding trotting records, but the movement is not yet so popular as trotting.

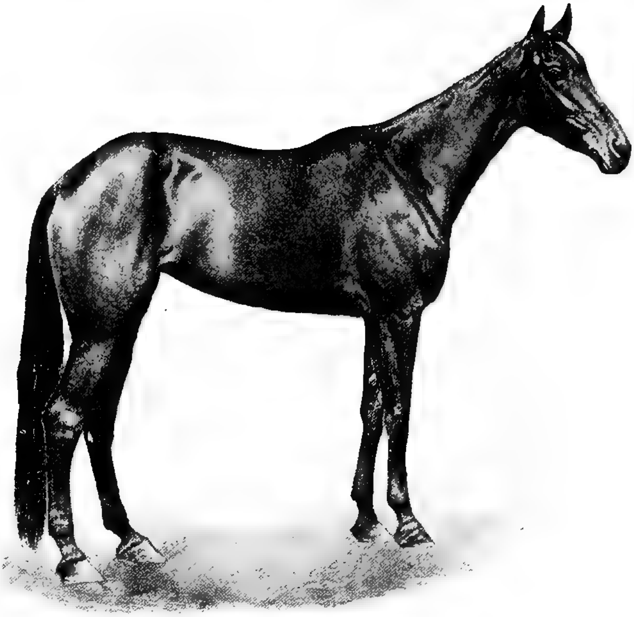
Important lessons to British breeders are to be learned by studying the early history of the American trotter, which in a word may be said to be descended from the best blood of the English "running" or "race-horse"—the so-called "thoroughbred,"—with a happy combination of other blood —notably of the old English trotting horse—the ancestor of the Hackney of the present day. Macleod says:—

> "The foreign horse that played the most important part in originating the American trotting breed, and that which conspicuously figures in the ancestry of our greatest sires and performers, was Imported Messenger. Messenger was a grey horse, foaled in 1780, bred by John Pratt, of New Market, England, and, according to the English Stud-Book, was got by Mambrino out of a daughter of Turf. Mambrino was by Engineer, son of Sampson, by Blaze, by Childers (Flying Childers), son of the Darley Arabian, a horse imported to England from the Levant in the reign of Queen Anne. Turf, the reputed sire of the dam of Messenger, was by Matchem, son of Cade, by the Godolphin Arabian."

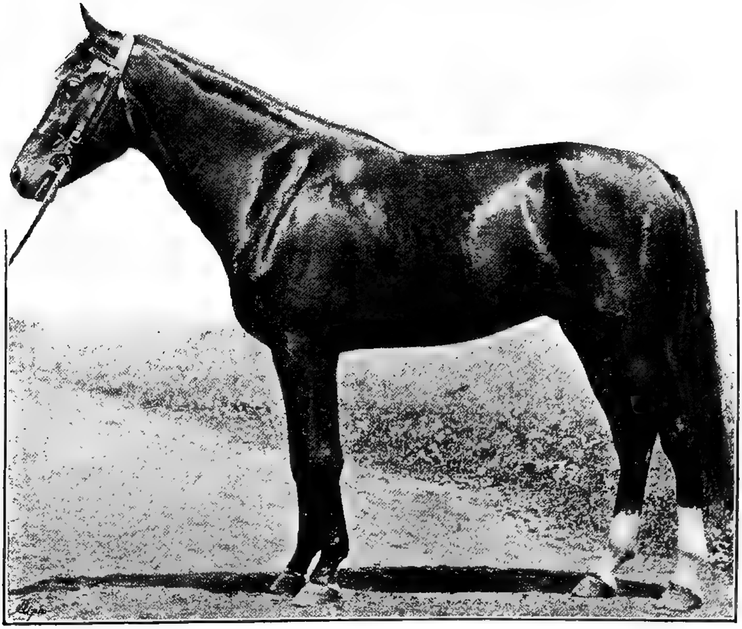
It is believed that Messenger was not a pure thoroughbred because his grandsire, Engineer, sire of Mambrino, had not a complete pedigree record.

There was in this circumstance an opportunity afforded for the introduction of trotting qualities and tendencies from the English trotter of the day, while at the same time the preponderating share of blood was derived from the thoroughbred connection. The thoroughbred type has also been maintained by the repeated use of thoroughbred mares

XLIX.



A.—AMERICAN TROTTER MARE, "SUNOL," 2 : 8¼.
The Property of ROBERT BONNER, 8 West 56th Street, New York.
From a copyright photograph by permission of Schreber & Sons, Philadelphia.



B.—AMERICAN TROTTER STALLION, "ALLERTON," 2 : 12.
Bred by C. W. WILLIAMS, Independence, Iowa.

as dams of trotting stock. It is acknowledged by all the best authorities that great uncertainty exists as to the ancestry of many of the founders of the trotting breed, but well-authenticated instances of the introduction of Norfolk trotter blood nevertheless exist. Imported Bellfounder, the sire of the dam of Rysdyk's Hambeltonian, generally conceded to be "the greatest of all American trotting progenitors," is believed to have been of Norfolk blood. The two stallions mentioned below, Axtell and Allerton, belong to this line of descent. Messenger, mainly through Mambrino, his most famous son, was the fountainhead of the four chief trotting families of the day—(1) the Hambeltonians, (2) the Mambrino Chiefs, (3) the Clays, and (4) the Black Hawks or Morgans.

Until unprecedented records were made by the brown mare Nancy Hanks* (6), 2:04, **the three most famous trotters** of the day, called the "Trinity of flyers," were Axtell (3) 2:12, Allerton (5) 2:09¼, and Sunol 2:08¼. Axtell and Allerton were bred by C. W. Williams, Independence, Iowa. Though Axtell possesses the greatest popular reputation, Allerton is believed by experts to be the better horse. Axtell was sold to a syndicate in 1889 for 105,000 dollars, the highest price ever paid for a horse in America. He was retired to the stud, where he has been highly successful, and his service fee fixed at the enormous sum of 1,000 dollars. The mare Sunol, the property of Robert Bonner, of New York, was bred in California, and sold at three years old for 41,000 dollars. The accompanying plate of Allerton and Sunol shows that trotting power, in either male or female, is not incompatible with elegance and beauty of symmetry. It also shows that in racing performances of a high order, "blood" or breeding is sure to come to the front.

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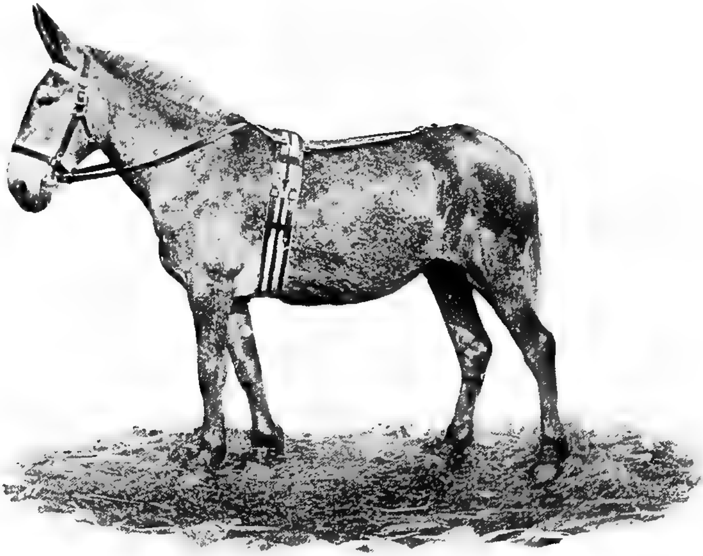
* Nancy Hanks, bred in 1886, by H. Boswell, Lexington, Ky., first beat record on a regulation or round track with 2:07¼, or 2:05¼ on a kite-shaped track, which is considered to be two seconds faster than the other; but as a six-year-old, in the autumn of 1892, she lowered her record to 2:04 on a round track, and established her reputation as a "lightning striker."

Though the best trotters show **breeding** in a conspicuous manner, yet there are certain peculiarities of form which have become developed in a marked degree—for instance, a massiveness or heaviness of the shoulder point, which is not present in a horse with a running gait, and a great length of hindquarter from the hough upwards. The trotter as a rule is good-natured, tractable, and easily trained. His step is long and low, qualities which admit of speed but which do not attract public interest as readily as the high and showy action of the Hackney does.

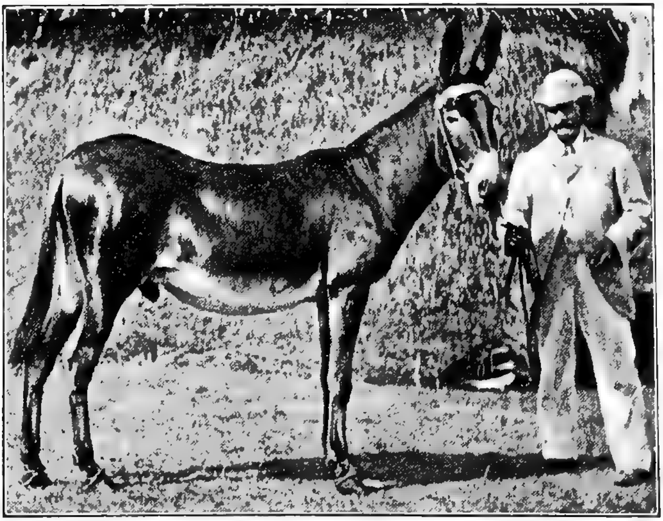
Although it is only between thirty and forty years since trotting became fashionable in America, the breeding of trotting horses is now one of the greatest live stock industries in the United States. Trotting does not, however, monopolise the racing interests in America. In New York, galloping races are much more numerous than trotting races, and absorb by far the greatest share of the attention of sporting men. Towards the west the interest in trotting increases, and in Kentucky, for example, it is all-absorbing.

THE DOMESTICATED ASS,

Asinus vulgaris, differs from the horse mainly in the absence of wartlike processes (chestnuts) on the hind legs; in having contracted hoofs, long ears, and a short erect main; in the long hair of the tail being confined to a tuft near its extremity; and in the sound of its voice or specific call. The difference between the bray of the ass and the neigh of the horse needs merely to be mentioned, not described. Three black stripes, one down each shoulder, and the third along the line of the back-bone,—said to represent the results of the three strokes given by Balaam to his refractory ass,—though regarded as typical characteristics of the ordinary brown or mouse-coloured donkey, are not always present,



A.—POITOU MULE, "BEAUTY," 17 hands.
First at the Royal Agricultural Society of England Show at Kilburn, 1879.
The Property of C. L. SUTHERLAND, of Coombe, near Croydon, Surrey.



B.—JACK DONKEY, "MALTA JACK," 14.1 hands.
First at the Royal Agricultural Society of England Show at Windsor in 1889.
The Property of C. L. SUTHERLAND, Coombe, near Croydon, Surrey.

being absent from the large white haired, though black skinned, Syrian donkey, so popular in Egypt with European visitors.

The domesticated ass is generally supposed to be most nearly related to the wild ass of Abyssinia (*A. tæniopus*); but whether the wild ass has broken away from civilisation, or has been tamed and tutored into the docile and patient creature which has from time immemorial been under the control of man, is likely to remain an unsettled question.

The wild ass of Central Asia (*A. onager*), which is noted for its swiftness, and for more slender build than that of those already mentioned, also differs in having shorter and less sharply pointed ears.

The diminutive size of the common British and Irish donkey is due to two main causes,—(*a*) the want of attention in breeding, and (*b*) the coldness of the climate, which, through generations of neglect, has been permitted to exercise its full influence.

In countries where the ass is held in high favour—for example, in Syria, Arabia, Upper Egypt, Spain, and the United States of America,—he is represented by animals of special excellence and value. In Kentucky, where great attention is paid to the breed, not purely on account of its own value as such, but for the rearing of mules, the size of animals bred from the best Spanish imported stock frequently reaches 15.2 and 16 hands. For certain descriptions of work there is no doubt the ass and the mule are admirably suited, and might with advantage be more numerous in this country. In America there is a greater impetus given to the breeding of them owing to the more trying nature of the climate, so that their hardiness and power of endurance as compared with those of the horse are put to the test and show to advantage.

The Mule, properly so named, is the produce of a cross between a Jack-donkey and a mare, while the animal produced by a stallion and female ass is called a **Hinny.** The latter is rarely seen, and is usually inferior in size and quality to the mule, which is a most valuable beast of burden in hilly regions or in hot countries, being more sure-footed and possessing greater powers of endurance than the horse, more especially when living on poor food. In external form the mule most strongly resembles the ass; but when bred from a heavy draught mare, it combines with this something of the superior stature and massiveness of the mother.

The mule has not been much used in this country, except in tramway cars in London, Glasgow, and a few other populous centres for a few years subsequent to the sale of pack mules which occurred after the close of the last Egyptian campaign. The secretary and manager of the Glasgow Tramway and Omnibus Company writes, in September 1892, "We have now no mules, having allowed them to run out"; no doubt because there exists no means of procuring them in the open market in this country.

"Mules have some advantage over horses in tramway work,—(1) they are not particular as to the quality of their food, and they consume less of it by about 7 lbs. per day; (2) they are not nearly so liable to fall, being very sure-footed; (3) they are durable, and fully four miles per day more can be taken out of them than out of horses."

In America they are extensively employed. The U.S. agricultural returns for 1892 show the existence of 2,314,699 mules in the United States, which take their share in the work of the country with the 15,498,140 horses which appear in the same table.

The good qualities of the mule in the performance of farm work in England has been demonstrated by Edward Pease, of Darlington, and by C. L. Sutherland, of Coombe, Croydon. At the latter place a farm of 300 acres (90 being arable) was worked entirely by mules, which consumed a bushel of oats each per week with green clover in summer, and one and a half bushels of oats each per week with hay during winter. Mules are not only hardier and less liable to become lame than horses, but in competition with horses of their own weight they are more powerful. Consequently, where mules are understood and appreciated, the price of a work mule is relatively higher than that of a horse.

The mule is generally believed to be barren, but this is not so in the case of the female mule and female hinny. The foal of the she-mule, which may be got by either a Jack or a stallion, is however seldom born alive.

The mule is more feeble as a young foal than the pure blooded foal of the mare or of the she-ass. It is also longer in reaching maturity, but it lives longer, and may be worked for a longer period than the horse.

CHAPTER XV.—THE HORSE—BREEDING AND BREAKING.

Breeding—Selection of the Mare—Treatment of a Farm Mare—Taking the Horse—Difficulties about Conception—The Foal—Young Cart Horses—Castration—Breaking—The Age of a Horse from his Teeth.

SOUND animals of good blood and good pluck, and free from any vicious tendency of temper, should be selected to breed from.

Three years old is an early enough age to put a mare to the stallion; if she be younger, or if she be too old, the foal may be small and weakly. The period of gestation is about eleven months. May is the best month for foaling, as there is then an abundant supply of green food, and the weather is mild enough for brood mares to lie out in the fields. At going out, shelters ought to be provided for a few nights to prevent taking cold. Small but increasing amounts of green food should be given for a few days before this event, to accustom the digestive system to the change, and thus to prevent colic.

A farm-mare should continue to do a moderate amount of light work, such as ploughing, till the day of foaling, but should not be put between shafts for some months before that time, as owing to the enlarged size of the belly as parturition approaches there is risk of injury. The quantity of concentrated or rich food ought to be restricted in the case of a mare in high condition some little while before her time is up. Wax is seen on the teats within twenty-four hours of foaling, and after it appears the mare should be regularly watched, to prevent her doing injury to the foal at birth by lying down with her tail too close to the wall: beyond these precautions she rarely requires assistance. A roomy loose box is the best place for her to occupy.

The foal should be induced to suck immediately. If this is not possible, a little milk must be drawn by the finger and thumb from the mother's teat into a spoon and poured into the foal's mouth, as a foal cannot live long without food. To see that the anus of the young one is not by chance closed by an adventitious skin or membrane which requires to be broken, and to give the mother frequent small drinks of cold water with a little oatmeal thrown into it, along with a suitable amount of digestible food, is all the further treatment necessary under ordinary circumstances. Should the navel be attacked by flies and become raw, it may be wetted with an infusion of walnut leaves, and dry flowers of sulphur powdered over it, to encourage healing and to ward off flies.

No nursing mare ought to be put to work if it is possible to avoid doing so, as this precaution reduces the chances of the development of scouring or of rickets in the foal. In any case, she should have a clear month's rest after foaling before going to work, and each time after returning from work a little milk should be drawn before the foal is allowed to suck. The milk which collects in the udder while the animal is at work changes in character from natural milk, and an alkaloid is liable to be developed which is injurious to the young.

A mare takes the horse from seven to ten days after foaling, and is then most likely to conceive. If "missed" the first time, she comes in season every three weeks during the summer, remaining "in use" or "on heat" from four to eight days. By the second time she is in season there is a large flow of milk, which to some extent reduces the system and renders conception less certain. At the period when a mare is going out of season she is most likely to conceive, "hold," or "settle." One good "jump" or connection is better than several at one time or on one day; but in the event of a mare being covered soon after she comes in season, it is an excellent practice to give her a second chance in a few days, or just before she goes out, and she should be kept quiet and away from other horses for a few days to prevent excitement and the consequent repeated attempts to discharge the contents of the uterus and vagina. If this is attended to there is no necessity for douching her with cold water, which appears to be an unnatural and unnecessary practice under any circumstances. It also appears to be wrong to put a mare to two horses within two days, though the practice of crossing a mare with a second horse, if there is any doubt about the potency or ability of the first stallion, tends to increase the number of successful connections.

A stallion will serve eighty mares in the season, and get on an average forty to fifty foals, if he be not made to travel too great distances to find the mares. Some valuable horses, that are such sure foal-getters that mares "settle" after the first connection, may cover a hundred. A horse with one testicle can get foals if it be down, but he cannot do so if it be carried out of sight.

It is frequently difficult to notice when small pony mares are in season, as they are not so demonstrative at this time as large animals. As a mare approaches twenty years of age, the chances of her conceiving, if she has never bred, or if she has not bred for some years, are not great. When a mare is in the habit of breeding regularly she will sometimes continue to do so till she is very old.* Conception is made more likely—when there is any tendency to barrenness—by the use of a cart horse on a thoroughbred mare, or of a thoroughbred horse upon a cart mare.*

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* At Bosby in 1886 the Author saw a cross-bred mare, belonging to W. Mould of the Harrington Arms, which was breeding at the age of thirty-two, and had bred twenty foals in twenty consecutive years. All were said to have been good, and a number were weight-carrying hunters.

A foal brought up by hand should be fed with cow's full-milk. It is frequently spoiled in disposition through being petted or played with, so that it becomes too familiar with its attendant, and loses the natural and necessary respect for the authority of its master. In Norfolk after the foal is two weeks old it is fed sometimes on skim-milk, boiled linseed, and bean meal, getting gradually up to two gallons of milk and four pounds of the mixture per day.

A foal is weaned when it is five or six months old, say early in October; then it should be housed at night, and a halter put on its head, with a short dependent end, left to lead it by. The operation of haltering is attended with danger to the animal, due to the resistance which is usually made, and requires great care. A cattle-shed with bare walls and a few inches of dung under foot is a good place to select. A cart rope should be fastened round the neck of the animal to draw it up to a fixed point,—such as a hole in the outer wall through which the rope is passed,—so that it is made to know what it is to be held. The struggle at first is often severe, and perspiration flows freely with the excitement and the exertion. After all this is over, the foal must be kept in a warm place till it is thoroughly cooled down. Gentle treatment and constant handling are necessary to give the creature confidence. Leading should be done as frequently by the "off-side" as by the "near," to accustom him to turn as readily to the one side as to the other.

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* Cowe of Mains, Chirnside, possessed a mare (nearly thoroughbred), which in 1886, at the age of twenty-three years, "held" to a cart horse, after repeated trials extending over some years with thoroughbreds. In 1887, however, she was successfully served by a thoroughbred. Had it not been for the breaking of a leg which ended fatally, she might have continued to breed for a number of years.

Young cart horses should never be too highly fed, as this softens the constitution, and they become too fat and heavy for the strength of their limbs. They should at all times be kept thriving to encourage growth, and to prevent disease and the injury which results from the presence of internal parasites. A little linseed cake mixed with oats is an improvement upon a diet of oats alone, and salt should be within reach of all young stock, which should also be allowed plenty of exercise to develop muscle. In the case of thoroughbreds the highest authorities say that they cannot be too liberally fed, provided they have sufficient exercise.

Castration is usually performed when a colt is about one year old, a time when there is little risk; or it may be done at two years if a well-developed crest and a more masculine appearance is wanted. In some districts of England from four to six weeks old is considered a safer and better time. The operation can be successfully performed while the animal stands on his feet, against a wall, an immense improvement on the old and much more risky method by which the horse was cast by means of ropes. The great danger in this is the possibility of injury to the spine, brought about by the animal struggling when down, and the danger is increased if any attempt be made to hold the feet so that he cannot move them in struggling. He is then liable to slip or break his back. The testicles are usually removed by torsion, or they may be simply cut away after the seminal arteries have been tied. The older methods of removal by firing-iron, or by means of clams, are not now much practised or appreciated. Bathing well with warm water should be resorted to next day if the animal be stiff, as is frequently the case after the use of the actual cautery.

The practice of docking horses, or cutting off a portion of the tail with the object of giving a better view of the hindquarters, is likely to decrease in future. It may linger in Hackney* studs, but it has almost been given up among Clydesdale, though not in Shire, horses, and it is decidedly objectionable when adopted in the case of large carriage horses or animals good enough to become officers' chargers. The pain, though severe for a few seconds, is not the ground upon which extremist humanitarians have really most cause to object to the operation. The removal of the most effective portion of the tail—the weapon which nature has supplied as a defence against the attacks of flies when the animal is turned out to pasture—is in reality the only important consideration.

Breaking is attended with danger from rearing, kicking, bolting, or sulking on the part of the horse; and carelessness, drink, or bad temper on the part of the man. Horses are more easily broken while quite young than when a few years older. Farm horses ought to run out in the fields during the second winter, within reach of good natural or artificial shelter, and be taken up for breaking in autumn, when about two and a half years old. Heavy work strains and stiffens a young horse. The backbone often becomes bent, and stands up, if an animal is made to draw loads that are too heavy. Harrowing or light ploughing is a suitable and safe form of work for a young animal; but carting on the hard road is not so till after he is five years old. Horses ought to be broken to every description of farm work when about three years old, or even before that time if convenient, and during the operation their vision should not be contracted by shutting in their eyes with blinders. The use of an open head-collar is the best preventive of bolting should derangement of the head-gear occur.

Mouthing is done by tying a horse up with a large bit and side-reins fastened back to a sursingle, but it is far too little practised among draught-horses. After this has been carried on at intervals for some days, the horse should be taken out to an open field, and long ropes fastened to his collar in the position of draught chains, and pulled by men placed well behind, to accustom the animal to the pressure on the shoulders and the sensation of the chains rubbing against the hind legs, such as occurs while turning in the plough. It should next be yoked to a log with ropes, and when accustomed to this treatment, put in double yoke with an old, steady, but active-stepping horse.

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* Undocked roadsters, when touched suddenly with the whip, are liable to throw the tail over the reins, and, getting alarmed, kick or bolt.

Breaking to the cart should come afterwards, as it is often a difficult task with nervous animals. The greatest possible care should be taken with all horses, although reputed to be quiet. A man on each side of the head should hold a long rein to prevent the horse, if startled, from jumping on the top of one or other of them. Two additional men, one on each side, should fasten the attachments, the draught chains being adjusted first. The kicking-strap or its common substitute, a rope, should cross over above the root of the tail, and each end be made fast to a shaft. This is far more effectual than when the rope is located in the usual place, further forward at the highest point of the hind-quarters. A fifth man lets down the cart behind when the horse has been got into position. A long pole should be placed between the body of the cart and the axle-tree, so that it projects well behind to prevent the animal rearing.

A wild or intractable horse may be subdued by the Australian method of tying his head round to his tail, and driving him round until he submits to be guided. By adopting this method any horse may be more quickly and safely put through all the various stages of the operation of breaking, but time must be given in any case to allow a young and inexperienced animal to become accustomed to what is required of it and to practise it.

A young horse should be tired, but never fagged by too much work, else he may develop bad temper. In a display of this an animal which urinates repeatedly is usually difficult to overcome. The mouth should not be subjected to sudden checking or tugging. An animal which has been thus ill-treated indicates its recollection of the abuse to which it had been subjected by trying to move away, and by holding up its head, on the approach of a man.

The shoulder and back, under the pressure of the collar and saddle, often become "fired," hot, and painful, especially in warm weather. *Remedy*—Bathe after work is over with tepid water, gently rub the part dry, and soak it with whisky, or white lotion—1 oz. sugar of lead and 1 oz. sulphate of zinc dissolved in a quart bottle of water. This is the best common lotion for broken or irritated skin.

A paste of fuller's earth plastered over any irritated or superficially injured part acts as a serviceable, stimulating, and healing dressing, provided it be left on till the cure is effected. This debars its use, however, when the injury is the result of the rubbing or pressure of the harness, except when the horse is laid aside from work.

While teething it is not unusual for a young horse to have a tender mouth and to refuse to eat. The gums should not be cut or fired as if the animal were suffering from *lampas*.

If off his food through being feverish from work, it is necessary to coax him by giving varieties of food, a little at a time, but at all times new and fresh.

Young horses pastured along with cattle gallop after them at times and prevent their thriving. Some cattle contract the bad habit of eating the hair from the tails of horses as well as from those of the other members of the herd.

In the case of horses with small feet, paring the edges of the hoof now and then, and blistering the coronet, encourage the growth of horn.

Idle horses are liable to rub, bite, and break gates, and escape from their own pastures to do damage to growing crops. A few strands of barbed wire nailed along the upper bars of a gate form a safe and simple preventive of the evil.

The age of horses able to do work may easily be determined by the teeth, if not more than eight years old.

At three years the two central permanent incisors are up.

At four years the next pair, or lateral ones.

At five years the two corner ones are come, making a full mouth ; also the tushes in the male.

At six years the hollow on the top of each tooth of the first pair is worn out.

At seven years the second pair is levelled.

At eight years all have usually been worn nearly level, or " mark of mouth " is lost.

Indications of greater age are grey hairs about the head and deep hollows above the eyes.

To make an animal look young, the teeth are sometimes "bishoped" by low dealers—that is, artificial hollows are made in the crowns of them.

An interesting little work on "*Horse Dentition*," by Sydney Galvayne, the Australian horse-trainer, published by Thomas Murray & Son, Glasgow, shows that there exist on horses' teeth well-marked indications of age at various periods up to thirty years, which have not been generally noticed or widely studied.

CHAPTER XVI.—THE HORSE—MANAGEMENT OF FARM HORSES

Winter Season—Work and Food—Medicines—Water—Mud-fever—Litter—Summer Season—The Soiling and the Grazing Systems of Feeding Horses—A Stallion—Possibility of Improvement.

WINTER **Season.**—Full work in the case of farm horses in country districts lasts for seven or eight months in the year: three months, from the latter part of August, including harvest, and autumn ploughing and cleaning, and nearly four months, beginning in spring, including February, March, April, May, and part of June—this embraces spring cultivation and ploughing, planting of grain crops, and the preparation of the root land. In many instances, especially in suburban districts and those which possess the advantages of a convenient railway communication, the busy season extends throughout the whole year. This is becoming more and more the case under intensive systems of farming which, as compared with the practices of our forefathers, have adopted a greater variety of crops in the rotation and an extended use of horse-power machinery, such as numerous recently introduced cultivating implements, and the various forms of hay-making and harvesting machines. On light land two hundred and eighty working days per annum may be taken as a good record in farm work, and with clay-land two hundred and sixty full days' work is satisfactory. The additional time, exclusive of Sundays, may or may not be taken up with the extra work necessarily associated with high farming.

The average cost of feeding a farm horse on an ordinary farm may be estimated at £25 per annum. The charge on a farmer for the support of a man and a pair of horses, taking into account wages and sundry expenses,—farrier's and saddler's bills, and interest on capital invested in the horses and the implements they work,—amounts to about £100 to £110 yearly, or a cost of about 7s. 6d. to 8s. 6d. per pair per working day. Little variation has taken place in this total figure during the last half-century, because, although the cost of food has fallen, wages have risen to a corresponding extent. Fourteen to sixteen miles per day is a sufficient distance for a horse to walk on a hard road if the work is regular. An animal will do its work more easily on a road with here and there moderate hills than on one which is level throughout, because the work done is then varied, and additional muscles come into play at times to break the monotony of the constant strain upon those which bear the burden upon a level road.

The food supply should be liberal, and should consist of a mixture made equivalent to three bushels of dressed oats (40 lbs. per bushel) per week. Grain should be bruised or broken, especially for old horses. Unless extremely dry and kept in a dry place, only a little should be prepared at a time, as the ingredients, especially oats, mould and spoil. In addition to oats, which would naturally form the greater part of the mixture, one or more of the varieties of food in the following list, according to what is cheapest in the market, should be included:—Beans, peas, lentils, barley, maize, a little malt or desiccated brewers' grains to assist the digestion, along with bran or linseed cake (restricted to one pound per day), to keep the bowels open. Oats have for some years maintained a relatively higher price, according to feeding value, than barley or wheat, in a great measure owing to the fact that the area in which oats can be successfully grown is more restricted in the hotter grain-producing countries than the areas in which wheat and barley are cultivated. In the warmer climate of the South of Europe, barley takes the place of oats as horse-corn, and there is no sufficient reason why the less expensive varieties of Mediterranean barley, not pure enough for brewing purposes, should not be largely employed to feed horses in this country. Should the high price of oats be maintained for a few years, the inducement to save expense will lead to the prejudice against barley as food for horses (unfounded as regards the flinty well-matured barley grown in abundance of sunlight), being given up by farmers whose prospects as bread-producers are not now too bright.

Dry bran prevents a horse bolting his food too quickly. Though beans when given in large quantities tend to produce costiveness, a small amount added to a food mixture has the opposite tendency. A little fenugreek meal or flour acts as a relish or spice, and is a valuable adjunct.

Indian pulses are now more or less used as ingredients in the mixed *purchased* foods of the various farm animals. It is not safe to include them until they have been thoroughly washed, as Principals Williams of Edinburgh and M'Call of Glasgow have traced a disease to the use of some of them in the food of horses.*

The diseases, or at least one disease—Williams's Liverpool horse disease—resulting from the consumption of the Muttar peas, is no doubt identical with the anthrax of India. It is a blood-poison, with the rod-like microbes of anthrax present.

As a horse has a small stomach, it should be fed at least three times a day—morning, noon, and night.

To prevent costiveness, cold bran mashes are better than boiled food, the latter being dangerous for colic, although it produces a glossy skin. In addition to restricting the amount of rich food given on Sundays while horses are at rest, saltpetre (2 to 4 drachms) is at times added to the usual bran mash on Saturday night, to prevent stocking of the legs, or Monday-morning-evil, in hard-worked and highly-fed horses.

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* Described in the *Veterinary Journal* for 1885 and 1886 under the title of "Lathyrus-poisoning."

The concentrated food provided during the slack season, whatever be the length of the period, may be averaged at one bushel of oats per week.

Fodder.—A large horse at full work will consume, in addition to short food, 18 to 24 lbs. per day of "seeds," hay, or strong-boned lea hay. A few lbs. may be saved if it is chaffed. In Midland and Southern England natural pasture or meadow hay is preferred for hunting and carriage horses, whereas in Scotland, pure ryegrass hay of luxuriant growth is generally most appreciated. Timothy-grass hay gives excellent results in either part of the kingdom, but the natural meadow or bog-hay of Scotland is often too soft in texture to be suitable for horses doing hard work. Hay is dusty if much heated in the stack, and then it injures a horse's wind. Heated oats are liable to produce the same result, and probably to injure the kidneys at the same time, and, moreover, horses do not care for them.

When clover hay is given *ad lib.*, 2 to 2½ bushels of oats, or the mixture, is considered to be enough of concentrated food per week for one horse. New oats are not good for horses, and should not be given till after the year expires in which they were grown. A supply of old oats should consequently be preserved until after the New Year. New or green oats make impure blood and induce liability to grease. Straw (usually oat-, but at times wheat- or bean-straw) is often given during winter, and hay in spring when hard work begins; but the best results are obtained by using a chaffed mixture of hay and straw throughout the winter season.

Chaffed straw should be allowed to lie for some time before it is fed to horses, as when recently cut it is liable to produce internal irritation, which may result in diarrhœa.

It is a good practice to give a few raw swedes, carrots, or mangels before leaving the stable for the night. Potatoes are liable to produce colic, and should never be given to horses. Furze or whin is sometimes grown as a forage crop to provide green winter food for horses, 30 lbs. being sufficient for each animal per day; but it requires to be chaffed like straw, or thoroughly bruised between rollers.

Medicines.—Two drachms of powdered sulphate of iron, mixed in a full feed of corn once or twice a day, is a good tonic for a horse, and is frequently required along with careful feeding in the "fall," after he goes into the stable. The physical system of the horse seems to go down at this season, probably with the change of coat. It is owing to this peculiar condition that roadsters at this time often become weak, and fall on the road and injure their knees. Tonics are better than physic in the correction of ordinary derangements, unless parasitic worms have to be cleared away. If a horse does not thrive when turned out to grass, the presumption is strong that he is affected by internal parasitic worms in the alimentary canal. *Treatment.*—To destroy worms, 1½ oz. of the oil of turpentine should be thoroughly soaked into dry meal, and administered along with 2 drachms of the extract of male fern and 1 pint of raw (unboiled) linseed oil. The ordinary purgative for a horse is a ball of aloes—6 or 7 drachms made up with 2 drachms of ginger. A horse should be prepared by feeding him entirely upon cold bran mashes for fully twenty-four hours before a ball is given. At times the preparation treatment alone is sufficient to restore a horse to its natural state of health. One of the safest, most simple, and effective drenches for a horse is 1 or 2 quarts of fresh yeast or barm.

Water should be given in a pure and fresh condition, though not too cold, when an animal returns from work. Water taken before feeding encourages eating, and prevents colic brought on by the washing of the undigested food from the stomach into the bowels. The practice of giving dry food before an animal has quenched its thirst, after exhausting work, is not to be recommended, although the system accommodates itself to this unnatural state of things, and the results are not, when it is regularly practised, so bad as might be expected. It is, moreover, safer to give water when an animal is warm, if not over-heated, than after he has been allowed to stand till he is cold and until the circulation becomes less active.

When horses are at rest in the stable they do very well if pure water is left within their reach at all times.

There is danger of inflammation of the intestines if a horse's belly is wet when the animal is not accustomed to it.

Mud-fever is induced by too frequent washing of the legs, adopted because it is the easiest way of cleaning them. If practised, the legs should be thoroughly dried, or the animal be made to walk a mile or two before going into the stable, to quicken the circulation and prevent the chilling of the skin through the rapid evaporation of the water. If neglected, the irritation, which begins usually about the heels, may extend to the skin of the body, and make it necessary to throw the animal out of work for weeks. One of the best preventives is to leave the hair of the limbs as a protection to the extremities, which are most liable to suffer from cold.

The grooming of farm-horses is far too little practised. They should be well rubbed down with dry straw on coming in from work, and thoroughly groomed when the hair has dried, to get rid of dust, which is to a large extent the remains of dried-up sweat. Good grooming, by increasing its comfort, is as good as an increase of food to an animal. To make grooming more easily performed, and to add to the animal's comfort, the hair on the under part of the body and the limbs above the knees and houghs may be removed with advantage by clipping. The extremities, which require protection to a greater degree than other parts of the body, should be permitted to retain their natural covering. Horses thrive best when thus relieved of the surplus coat of hair. It is no uncommon sight to see an unclipped horse, which had been heated in the yoke on the previous day, still wet on the following morning. This is an unnatural and unhealthy state of matters.

Litter.—To use barley straw as litter is objectionable: 12 to 14 lbs. per day of wheat or oat straw is much better. Bedding should never be stored during the day under the manger. When a good market for straw is at hand, moss litter may be substituted at a much cheaper rate. This costs about 25s. per ton, in 4-ton lots, carriage paid; and 1 cwt. is sufficient per horse per month during the winter season. If moss is allowed to become too wet before it is removed, there is a danger of injury to the horses' hind feet owing to the ammonia produced from the urine acting upon the weaker parts of the horn, with the result that sores break out about the heels.

Summer Season.—If horses are too highly fed when on green food and not doing full work, they are much more difficult to support in winter than when they are kept in an ordinary way. Along with green food in its season, 7 lbs. of oats, in two feeds per day, is enough for a horse. When at hard work this amount may be doubled. Some horses do not care to eat much corn when on grass; the teeth seem to become affected, or "set on edge" in the same way as those of a human being after eating unripe apples.

There are two common systems of feeding during summer: *First*, The soiling system, involving the cutting and carrying home of green food to horses turned loose when not at work in a large open yard with shelter-sheds. Clover, grass, vetches, and cabbages are all useful in their season. This is the more economical method if food is not plentiful, but it requires additional labour to that necessary when horses are grazed.

The second system involves the easier and more common practice of turning horses out to pasture over night and while not at work. The disadvantages of this method of treatment consist in horses, especially if young, galloping and cutting up the grass, casting their shoes, breaking their feet, and rubbing down fences and gates ; besides the risk of catching cold or contracting founder in the feet if carelessly turned out after being heated before they have properly cooled.

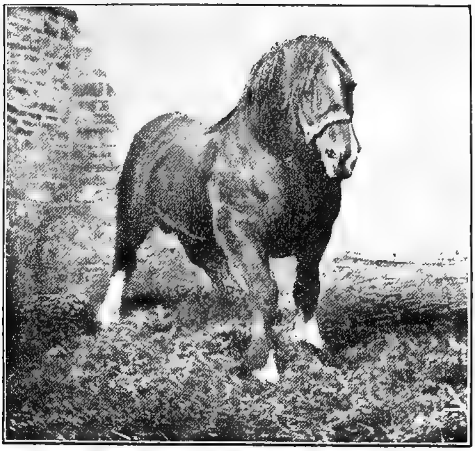
In the South of England work horses often go loose in yards during winter. They are thus put in the way of getting gentle exercise and plenty of fresh air to keep them healthy.

Should a horse sprain a limb and become lame, he must not go to work, as he will almost certainly become worse. Rest, and the application of cold-water-cloths to reduce inflammation, followed by firing and blistering to give strength, are the usual methods of treatment.

A winter out at grass without his shoes, and being allowed to get down in condition, though not too far, renovates in a marvellous way an old or any horse that has been overworked, of whatever breed. He takes sufficient exercise, and goes so quietly about, that a weak part is allowed to strengthen. It is thought that frost also aids in the recovery of unsound limbs.

A horse which has been highly fed will become much poorer when turned out than if he had been moderately kept, showing excessive feeding during summer to be a mistake.

Possibility of Improvement.—The average English work horse might be much improved if farmers' clubs would make greater efforts to secure the services of good horses in special districts, and not leave it to chance or to private enterpise, which in a matter of this kind is usually selfish.



The Shire stallion, "Hitchin Conqueror," in an irate condition, charging his owner, who had entered the loose-box with the object of photographing the animal.

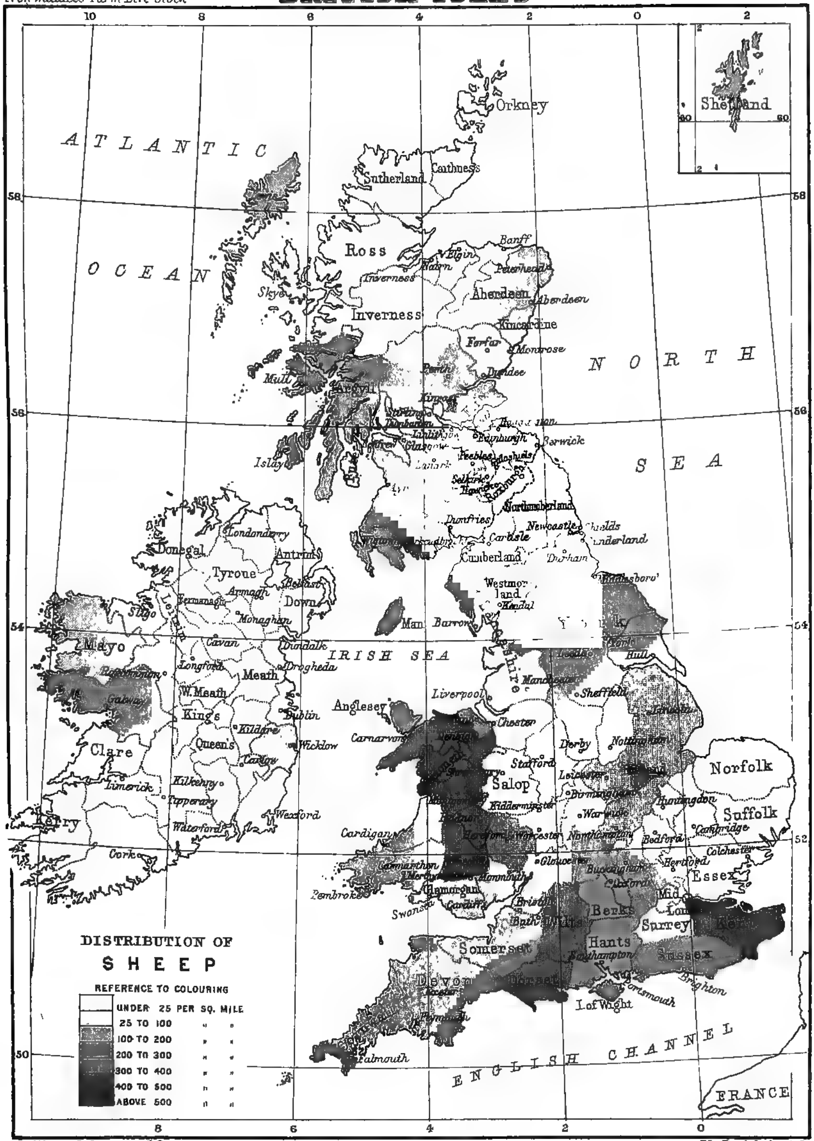
CHAPTER XVII.—SHEEP—BRITISH BREEDS.

Sheep — Classification — Fecundity — General Points — Characteristics of Different Breeds—**Long-wools**—Border Leicester—English Leicester—Lincoln — Long-woolled Devon — Cotswold — Wensleydale — Kent, or Romney Marsh—Roscommon—**Short-wools**—South Down, or Sussex—Shropshire Down—Hampshire Down—Suffolk Down—Oxford Down—Clun Forest—Dorset and Somerset Horn—Ryeland—**Mountain Breeds**—Cheviot — Black-faced Highland — Herdwick — Lonk — Limestone—Welsh Mountain—Old Tan-face Welsh—Exmoor.

SHEEP belong to the genus *Ovis*. They have been subjected to domestication for a very long period. They are classified in various ways in this country: horned and hornless, black-faced and white-faced, mountain and lowland, long-wools and short-wools, long-tailed and short-tailed. Iceland sheep possess remarkably small and insignificant tails. In the East there are sheep with rudimentary tails and large masses of fat on the rump. Others, again, have the fatty development in the tail itself. Two is the usual number of horns, but in the Western Islands of Scotland remnants of the ancient polycerated sheep exhibit four horns, or at times even a greater number. A general characteristic of the sheep is the presence of only one pair of teats from which milk can be drawn, though a second pair of rudimental ones is not infrequently seen in British breeds.

Fecundity, or the state of being prolific, differs much in different breeds of sheep, and in different specimens of the same breed. Some bear single lambs, some twins, and some triplets, while four and even five have been known to be brought forth at one birth. Although the local surroundings, including the kind, quality, and quantity of food, have

BRITISH ISLES



The Edinburgh Geographical Institute

John Bartholomew & Co.

English Miles
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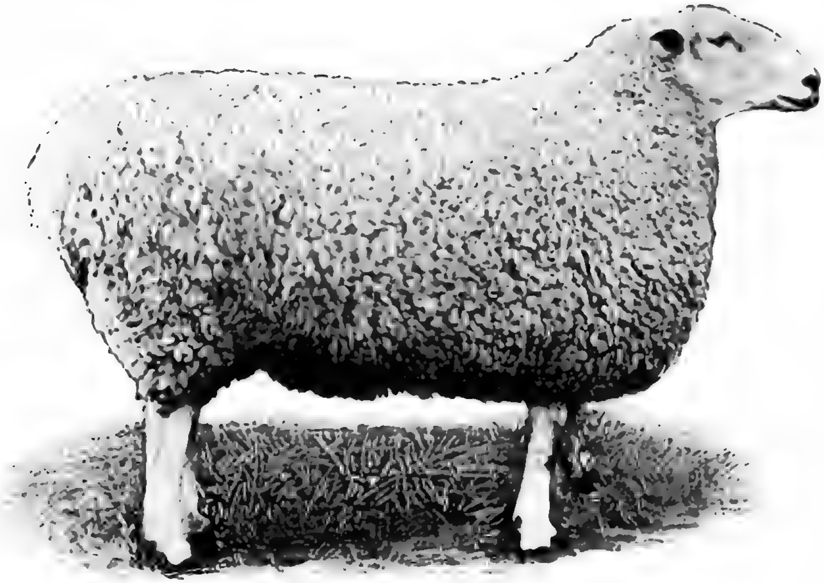
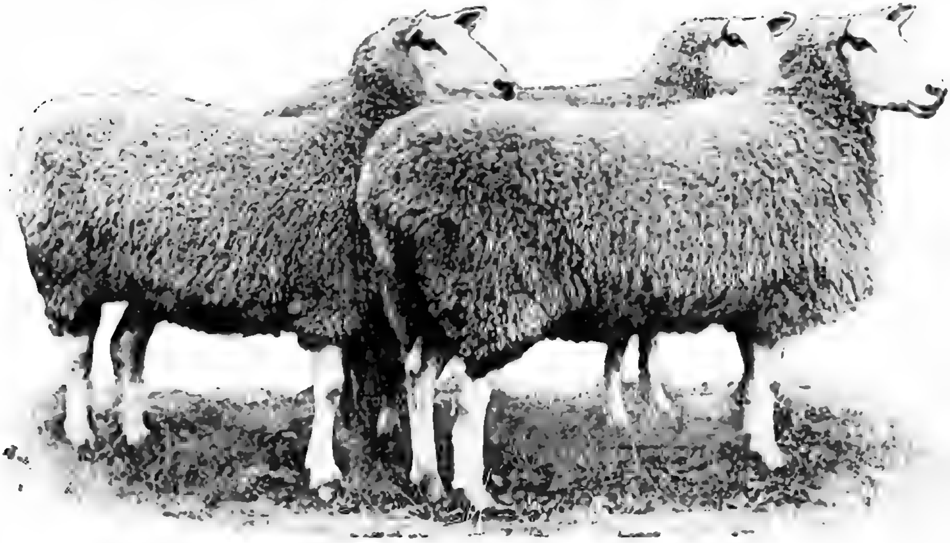


A.—BORDER LEICESTER RAM.

Sold at Kelso in 1886 for £50—Tweeddale Gold Medal, Glasgow, 1883.

The Property of the Right Hon. THE EARL OF DALHOUSIE. Bred by C. Clark, Oldhamstocks Mains



B.—BORDER LEICESTER EWES.

First at the Royal at Nottingham, and First at the Highland Show at Glasgow in 1888.

The Property of the Right Hon. A. J. BALFOUR, M.P., Whittinghame, Prestonkirk.

much to do in determining the issue, yet there is unquestionably an inherent propensity in certain ewes to follow regular habits in the matter of producing certain numbers of offspring. The tendency may have been induced by local conditions favourable to a particular object being continued through generations, and thus made accumulative. If sheep are well fed (but not too fat), and only the young of those bearing twins bred from, the flock after a time becomes distinctly more prolific.

POINTS APPLICABLE TO MOST BRITISH BREEDS OF SHEEP.

(*Exceptions in various breeds will be named when they occur.*)

1. A good *carriage* and springy style of walking:

2. The *neck* thick towards the trunk, tapering to the head, arching slightly, and not too short:

3. The *body* deep, and projecting well over the fore-legs; *under-* and *upper-lines* straight:

4. The *back* level and broad behind and before, except in the Cheviots and the Lonks, which have sharp shoulder-tops or withers:

5. The *ribs* well sprung and rounded:

6. The *shoulders* well covered with firm flesh: The regions immediately behind the shoulders well filled up:

7. The *thighs* or *gigots* and also the *foreflanks* fleshed well down:

8. The *rump*, or part near the dock, well developed, though not too large, as is sometimes the case in Cotswolds, Border Leicesters, and other heavy fleshed breeds:

9. The *legs* straight, but not too long nor the bone coarse: The houghs are much better slightly out than at all in or "cow houghed":

10. The characteristic *wool* of the special breed covering well the *body*, and particularly the belly.

CHARACTERISTICS OF THE DIFFERENT BREEDS.*

Long-wools, without Horns, excepting Mountain Sheep.

The Border Leicester was bred at first from Bakewell's Leicester by crossing with the Cheviot, but it now ranks as a pure breed, and is one of the best of the varieties of Leicesters. It is very largely used in the south-east of Scotland for crossing with half-bred, Cheviot, and black-faced ewes.

Special Points.

(1.) The *head* well set on, long, broad between the eyes, but not high on the crown, nor too heavy behind the ears; the two latter characteristics in the male bringing about difficulty in lambing:

(2.) The *muzzle* large, open, and black:

(3.) The *hair* on the face and legs white and hard (but not so wiry as in the case of the Cheviot), and extending well back behind the ears:

(4.) The *ears* not too large nor drooping, and white inside and out: Black *spots* appear sometimes with age:

(5.) The *belly* comparatively light, said to "carry little offal," and giving a leggy appearance when the animal is shorn:

(6.) The *wool* long, soft, and arranged in little locks, but not too open coated:

(7.) *Fat tegs*, at twelve to fourteen months old, *weigh* 23 lbs. to 25 lbs. per quarter.

The Improved English Leicester is the smallest of the Leicester breeds, and has been longer an improved breed than any other long-wool, with the possible exception of the Cotswold. Bakewell accomplished the formation of the improved breed by in-breeding and by selection. It has been much employed in crossing to improve other breeds

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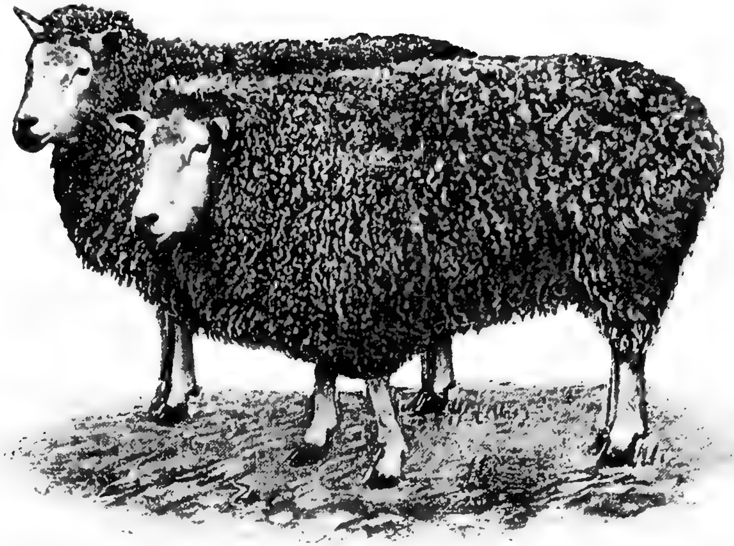
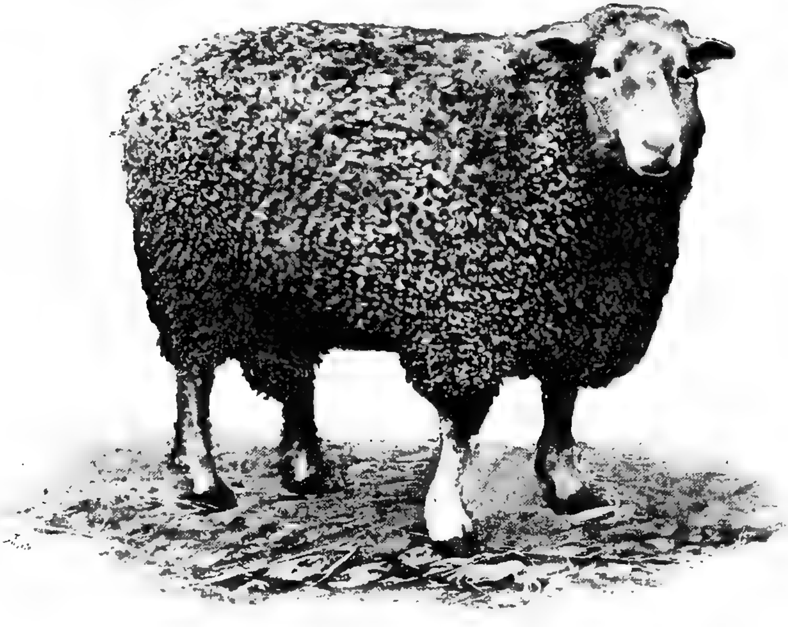
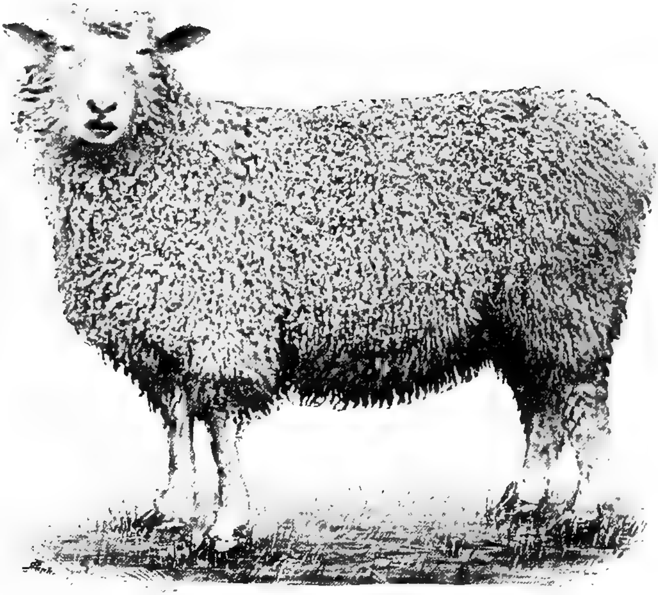
* For a list of flock-books see Appendix C.



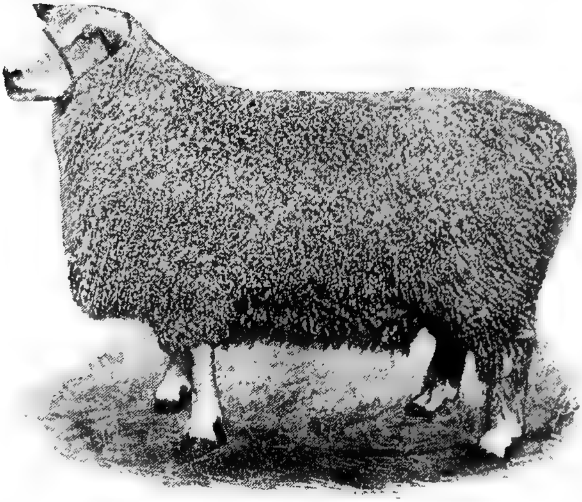
A.—ENGLISH LEICESTER EWES.
The Property of T. H. HUTCHINSON, Manor House, Catterick.



B.—ENGLISH LEICESTER RAM.
The Property of T. H. HUTCHINSON, Manor House, Catterick.



A.—WENSLEYDALE EWE.
The Property of T. WILLIS of Carperby, Bedale, Yorkshire.



B.—WENSLEYDALE SHEARLING RAM, "HARROGATE."
Champion at Ripon and First at Harrogate, 1890.
The Property of JOHN HEUGH, Mudd Fields, Bedale.

Special Points.

(1.) The typical sheep of this breed is *mild tempered*, and thus suited to the laying on of fat:

(2.) The *head* not too short, though smaller than in the case of the Border Leicester; the *face* white with a blue tinge, and the *hair* not so hard as in the Border Leicester: A pinky face and soft hair indicate want of constitution:

(3.) The *bones* very fine:

(4.) The *hindquarters* very frequently not so large as they ought to be:

(5.) Great *aptitude to fatten early*, both in the pure breed and its crosses:

(6.) The *mutton* is best when not over twelve months old (weighing under 20 lbs. per quarter), being greasy and inferior if well fed and not killed till two years old:

(7.) The ewes not first-rate *milkers*, and the lambs rather delicate on account of the close-breeding.

The Wensleydale is a large, high-standing Yorkshire-Leicester breed, with a characteristic blue colour in the skin of the face and ears, which sometimes extends to the whole of the body, though the shade is deeper on the bare or hairy parts. The dark colour is cultivated, because in the extensive use of the rams in crossing with the Scotch Blackfaced breed it is found that dark blue rams throw dark faced lambs, a point which is considered valuable.

The lambs bred in this way are termed "crosses" in Scotland, where they are extensively kept for "hogging." In the east of Yorkshire and in Lincolnshire, where many thousands of them are annually bought and fattened during winter, they go by the name of "Mashams."

Wool of uniform open character, long, and divided into little knots or "pirls," should cover nearly the whole surface of the body, including the forehead between the eyes, round the ears, and on the belly and scrotum. The back of the hind-legs down to the hoofs, and at times even the fore-legs, have downy wool on them. Hairy wool on the thighs where the coarsest wool tends to grow is objectionable.

The head is of a good size, and well carried on a long and strong neck, giving much greater style of carriage to the breed than is usual with most Leicesters.

The nose should be wide, and in the ram slightly arched; the back of the head flat, and the ears large, but well set on and well carried. The breed is specially noted for the absence of patchiness or excess of fat. The crosses bred from it are slower in coming to maturity than those of Border Leicester or the other breeds of long-woolled sheep. The quality of flesh produced, the hardy constitution and active disposition, enable it, however, to maintain the position of first favourite in many districts, though it must be admitted that in some counties, such as Dumfriesshire, Border Leicester rams are coming rapidly into favour, and displacing the Wensleydale in breeding half-bred lambs by Cheviot ewes.

The Improved Lincoln is white-faced, and is as large as any sheep in England,—though not larger than the Cotswold. It was produced by crossing the old Lincoln, which was famous for great length and quantity of wool, with the English Leicester. There is still a tuft of wool on the forehead, though not so abundant as of old. The fattening qualities have improved, although the wool has become shorter, lessened in quantity, and deteriorated in quality and in lustre. The wool of the breed as it now exists is nevertheless of superior quality. The staple* of well-bred tegs should be about as broad as two of a man's fingers.

The Long-woolled Devon strongly resembles the Lincoln, but is not so large. It is coarser boned, and does not

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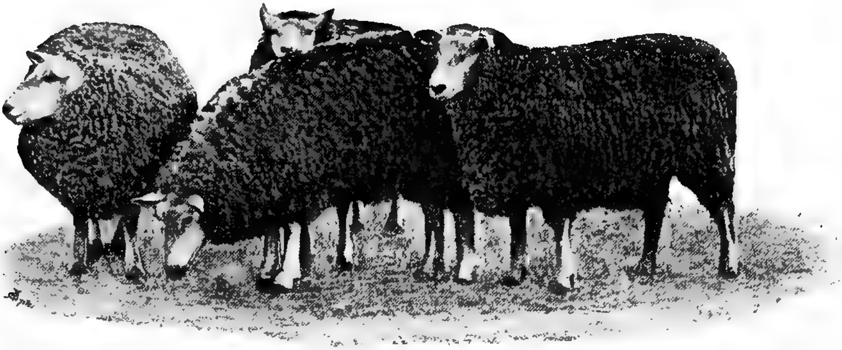
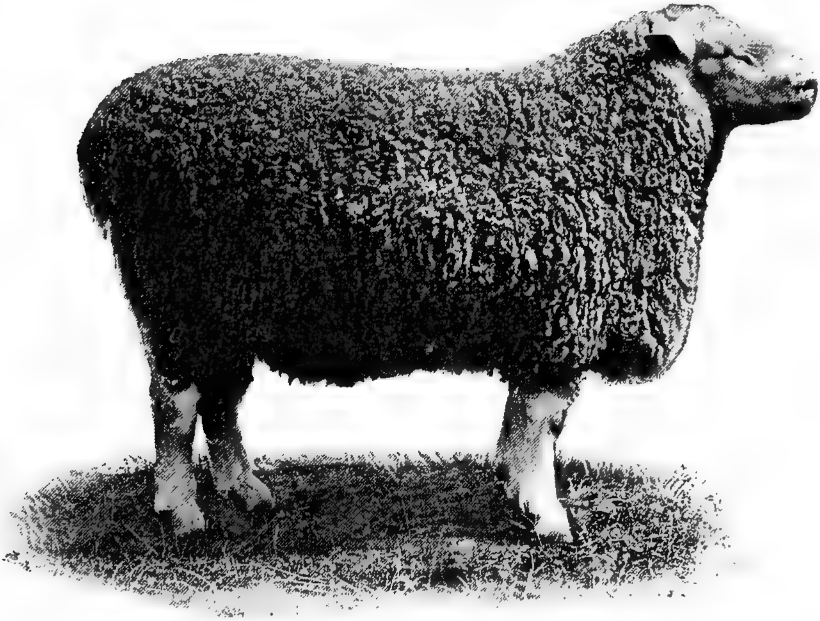
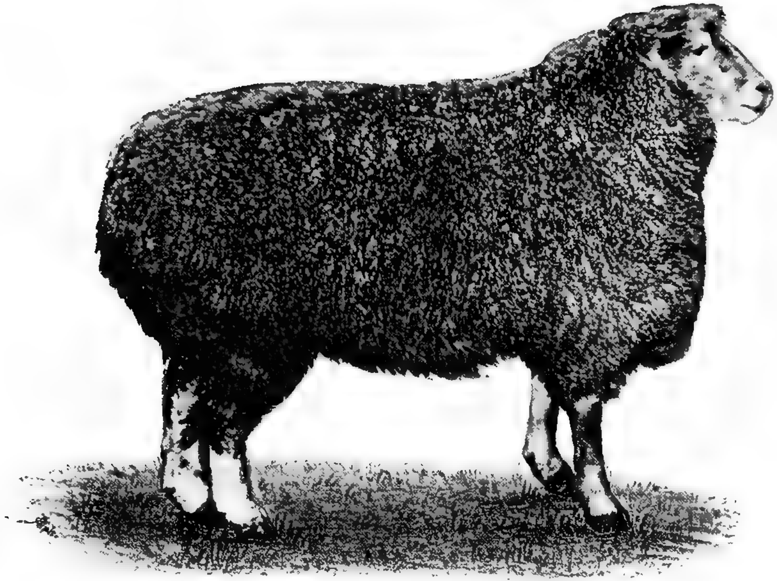
* The word staple here refers to the natural locks consisting of many fibres of wool arranged naturally in bundles, but it is also sometimes wrongly used with reference to a single fibre.



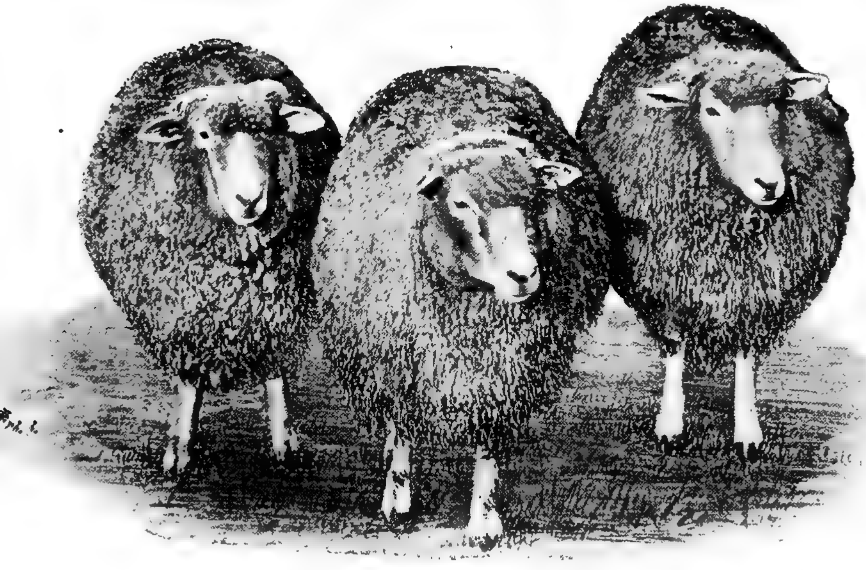
A.—LINCOLN EWES—FOUR OF A PEN OF FIVE SHEARLINGS.
First at the Royal Agricultural Show at Preston, 1885, &c. &c.
The Property of ROBERT WRIGHT, Nocton Heath, Lincoln.



B.—LINCOLN RAM.
First as a Two-Shear Ram at the Royal Show at Preston in 1885, &c. &c.
The Property of ROBERT WRIGHT, Nocton Heath, Lincoln.

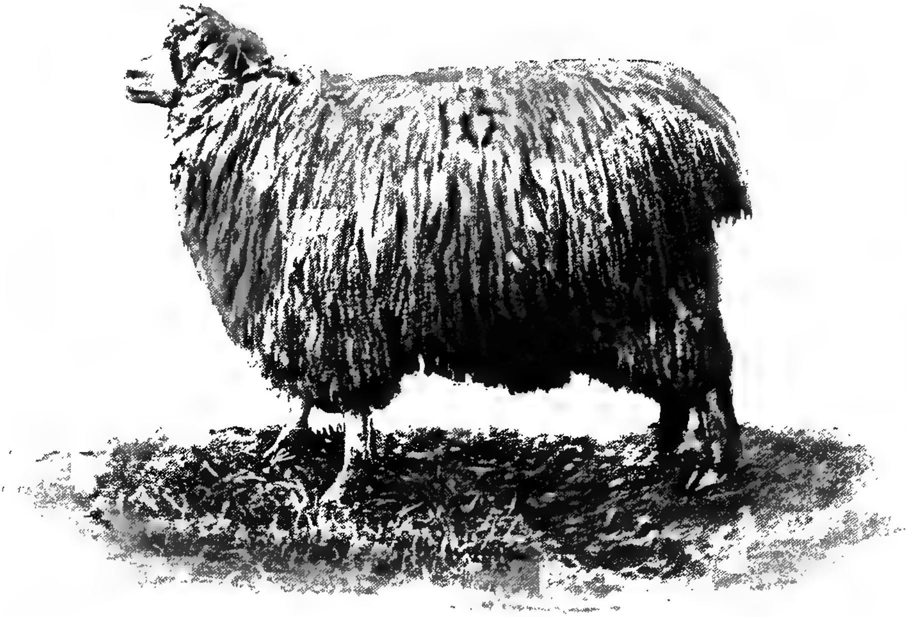


A.—Devon Long-Wool Two-Shear Ram.
First at the Royal at Nottingham in 1888.
The Property of Sir J. H. H. Amory, Bart., of Knightshayes, Devon.

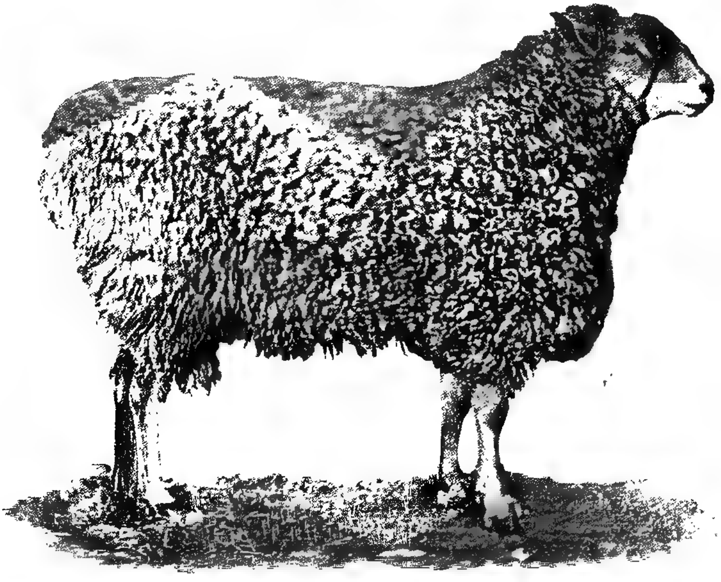


B.—Devon Long-Wool Ewes—Three out of a Pen of Five.
Newport; First at the Royal, Nottingham;
Cup, at New Quay, &c.
[illegible] Amory, Bart., of Knightshayes, Devon.

Plate LVI.



A.—Cotswold Ram Lamb.
The Property of Russell Swanwick, Royal Agricultural College Farm, Cirencester.



B.—Two-Shear Cotswold Ram, with Two Months' Growth of Wool.
First Prize at Vienna International in 1873.
The Property of Russell Swanwi [illegible]

show so much breeding. The face is white, with a lock on the forehead, and it is woolled well on to the cheeks. Leicester blood was employed in its formation, and it has in times past been dashed with the Cotswold, which it also resembles to some extent.

The Cotswold is generally supposed to derive its name from the Cotswold Hills, but the writer of the historical statement published in the first volume of the Cotswold flock-book points out that it is not improbable the "sheep gave the name to the hills upon which they exist—'cotes' meaning buildings in which they were formerly housed, and 'wold' being a wild open country." Gloucestershire, which may be regarded as the centre of the home of the Cotswold sheep, was in the time of the Romans, early in the 2nd century A.D., the seat of a large trade in the manufacture and sale of woollen cloth. From this it may be inferred that considerable care was devoted by our ancestors even at this remote time to the breeding of sheep, which there is no reason to doubt were the progenitors of the Cotswolds of the present time, so that the breed is one of the oldest if not the oldest in Britain. The trade in both sheep and wool was maintained throughout both Saxon and Norman times, and at the present day considerable numbers of Cotswold sheep are annually exported to Germany, to the United States of America, and other foreign parts, where they are appreciated for their large size and for the power of stamping their distinctive characteristics when crossed with other breeds.

It too has been improved by introduction of Leicester blood. It is extremely hardy and well suited for feeding on stiff land, even when it is pretty wet. The flesh becomes coarse when sheep grow aged. At twelve to fifteen months old tegs ought to weigh 25 lbs. to 28 lbs. per quarter. Those more moderately fed, and "run over" till two years old, get up to 35 lbs. or more per quarter.

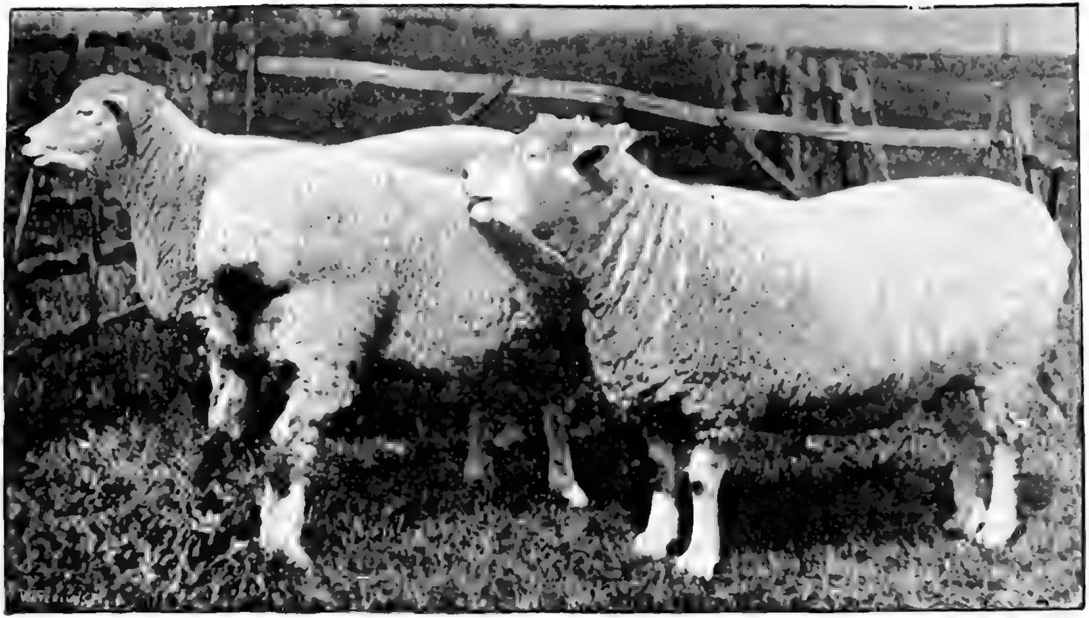
Points.—Faces strong, usually white, sometimes grey, with legs to match. Dark colouring on these parts gives the Cotswold more the look of a Down cross, and helps to sell the mutton at a higher price. A large tuft of wool covers the forehead, and when full grown ought to hang down almost to the nostrils. The ewes are fairly good milkers; and they are also prolific when not too fat or with too large a rump. The fleece of wool averages from six to eight lbs. for ewes. The fibre is long, neither close nor too open, and rather coarse in quality. The belly, and particularly the scrotum or "purse," should be well covered with wool.

Through being an old breed of good size, it is well suited to crossing with ewes of short-woolled, smaller boned, and finer varieties, provided the head of the ram is not too large, with the object of avoiding the difficulty the ewe might experience in giving birth to the lamb.

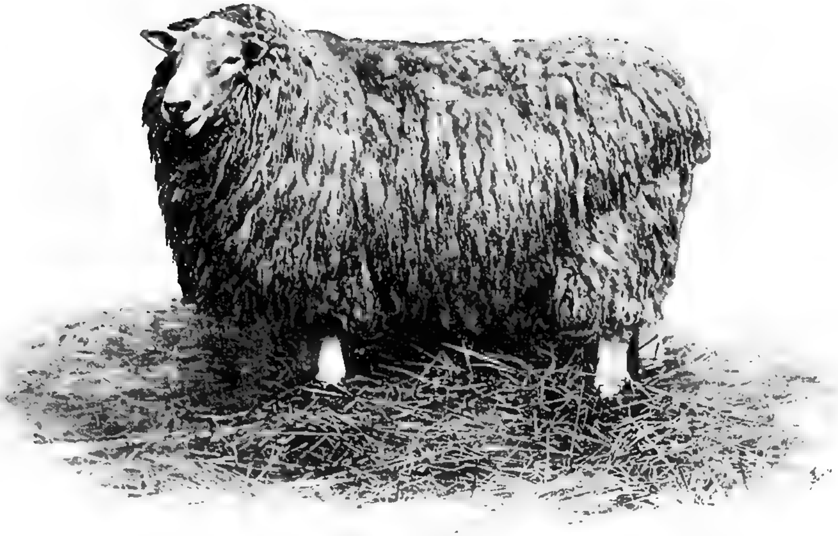
The Kent or Romney Marsh is a hardy whitefaced breed, which is related to the Cheviot, and much resembles it in general appearance. It has been somewhat modified by crossing with the Leicester. Kent sheep are usually not artificially fed in winter when on natural pasture, and, like the Scotch mountain sheep undergoing similar treatment, do not lamb till April. A lamb to each ewe is under such circumstances a good crop. The wool is good, and the breed is one of the closest coated of the long-wools. **Points.**—The fore-lock is sometimes wanting, and on account of this and other irregularities the type is not distinct, though the best class of sheep is compact and symmetrical in form, and noted for great breadth of forehead and strength of bone. The backs of fat sheep of this breed are hard to the touch, and the shoulder and back-bone are liable to stand up too prominently. The breed is in high favour in the north island of New Zealand, where much of the pasture is steep, and where a lighter and more active sheep is wanted than the Lincoln or the Leicester.

The Roscommon is an Irish breed to be seen in Con-

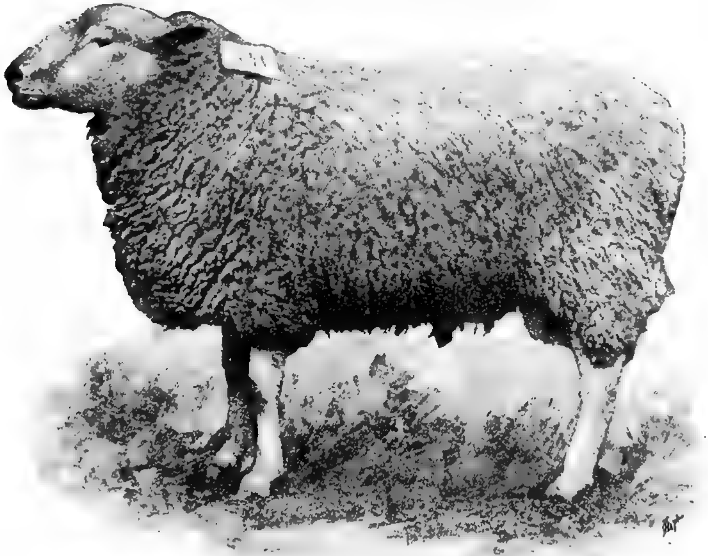
PLATE LVII.



KENT OR ROMNEY MARSH EWES, RECENTLY SHORN.
The Property of HENRY RIGDEN, Lyminge, Hythe, Kent.

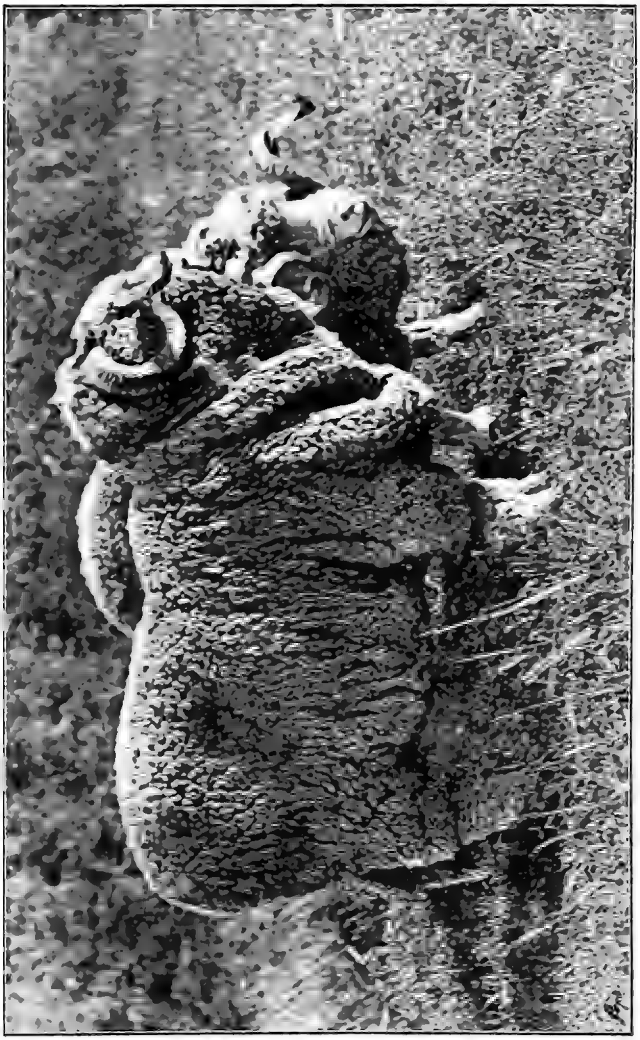


A.—KENT OR ROMNEY MARSH SHEARLING RAM IN ITS WOOL.
First at Windsor Show in 1889.
The Property of HENRY PAGE, Walmer Court.



B.—ROSCOMMON TWO-SHEAR RAM.
First at the 1867 Show of the Royal Agricultural Society of Ireland.
Bred by RICHARD FLYNN, Cams, Co. Roscommon.

PLATE LIX.



Vermont Merino Rams

naught. It was improved from the old form by selection and by crossing with the Leicester. It is quite as large, if not larger, than the Cotswold or Lincoln, and the mutton is said to be of finer quality. The fleeces are long, heavy, and silky.

The Merino.—In the matter of wide distribution, this breed occupies among sheep the position held by the shorthorn among cattle. By far the largest number of sheep in the Australian Colonies, in the Argentine Republic, in the United States of America, and at the Cape of Good Hope, belongs to this breed, or to crosses which are nearly related to the Merino. All are believed to have sprung from the Spanish Merino,* though there are many distinct types known by specific names,—as, for example, the Vermont Merino, the highly bred American sheep; the Rambouillet or French Merino; the Negretti, to which the German Merino belongs; the Saxon Merino; and the various offshoots of these varieties to be found in the colonies of Australia and Tasmania.†

The breed is white in hair, hoof, horn, and wool; the bare portion of the muzzle is of an orange fleshy colour (white being objectionable); the eyes are light grey; the horns in the male well developed (not unlike the horns of a cross between the black-faced Highland and Cheviot breeds), spirally coiled inwards, and not placed too wide nor yet close enough to touch the cheek. In the case of ewes the great majority are absolutely without horns; when horns do appear they are comparatively insignificant.

To the touch, the back is thin-fleshed, and, as in the Cheviot breed, slightly elevated at the withers; the backbone is rather sharp. The skin of some breeds, notably the German and the Vermont, is more or less full and wrinkled, more particularly about the neck, but the great majority of the Australian Merinos are plain-skinned, with the exception, perhaps, of a few wrinkles at the neck. The looseness of skin and the folds were objected to by the shearers, who were greatly retarded in their work owing to the care it was necessary to exercise to prevent cutting the skin; but in these days of shearing by machinery, wrinkles do not offer such an impediment or source of danger.

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* Introduced into Spain by the Phœnicians and Carthaginians about 1100 B.C.

† For details of the different strains of Merino blood see the Author's work on the "Rural Economy and Agriculture of Australia and New Zealand," from which is extracted the description of the characteristics of the breed, printed in small type. See also "Sheep Breeding in Australia," by George A. Bruni: Walker, May, & Co., Melbourne.

Irrespective of the difficulty of shearing, wrinkles are not liked except as an indication of purity of breed. If it were not the case that the progeny of Vermont and other wrinkled sheep lose the wrinkles, the infusion of fresh blood of this kind would be less in favour. There is a tendency to the production of coarse wool fibre, especially on the crowns of the wrinkles when these are large and numerous. Wool should be abundant on the belly, and extend down the legs to the feet and well on to the head and face, so that at shearing-time little but the nose and hoofs are to be seen projecting from a flouncing ball of white wool. The part of the face not clad with wool should be covered with soft silky hair.

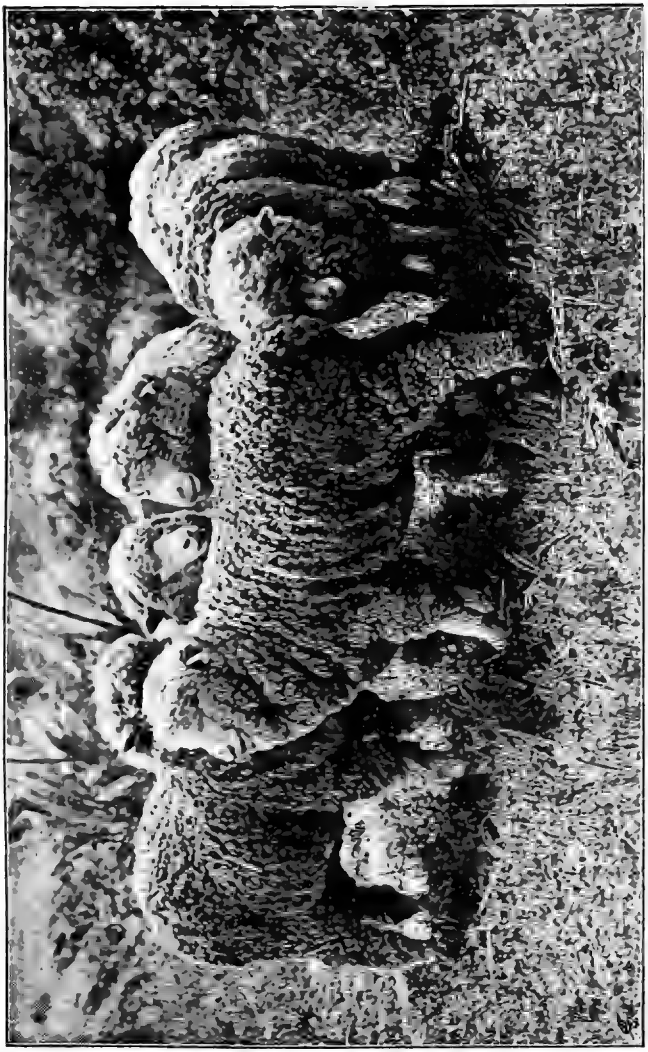
In well-bred sheep the wool is close, dense, and fine; though it varies in these characters as well as in length and profusion in the different varieties of the breed, and even within these varieties, according to the locality in which they are reared and kept, or, in other words, to the nature of the country, food, and climate.

Sheep generally produce finer wool after they are once shorn. Uniformity in the quality of the wool on the different parts of the body is striven for,—the wool of the hindquarter or thigh should not be hairy or strong in staple, but should resemble the wool of the side or forequarter as much as possible. On being parted for inspection, down the side, shoulder, or back, it should divide freely, without any sign of adhesion or matting, as this would stamp it as inferior for the purposes of combing wool. A fine, wavy, bright staple should be presented down the sides of the opening (a condition usually more pronounced near the forequarter than on the thigh), and at the bottom of it a bright flesh-coloured streak of skin.

A real Merino fleece, as it grows on the sheep, should be firm as a board, and packed like a cauliflower—the tips of the wool being even, neither fuzzy nor straight, nor standing up in places. With great length of staple, which is not a natural characteristic of the breed, the density which is of so much importance is lost.

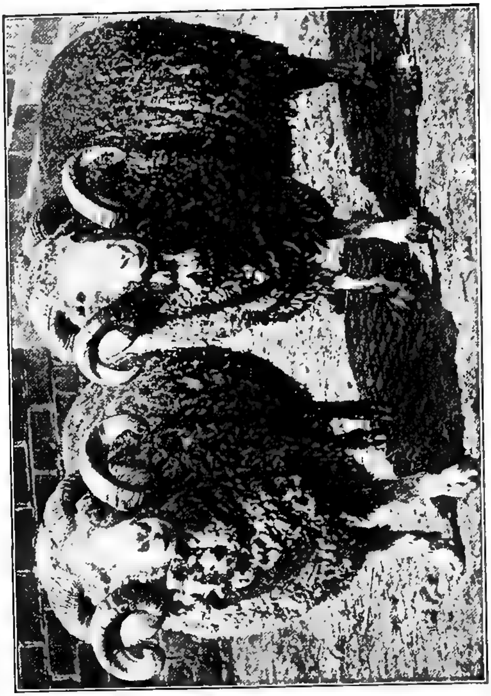
There are several **breeders of pure Merino sheep** in this country, all of whom have a favourable report to give of the success of this cosmopolitan breed even in our humid

PLATE LX.



Vermont Merino Ewes.

PLATE LXI.



MERINO CROSSES WITH SCOTCH BLACKFACE.

The Property of L. A. MACPHERSON, at Corrimony, near Inverness.

climate, which is very different from that of the parched-up country from which the Merino was originally dispersed. Among these may be mentioned the names of Sturgeon & Son, Grays Hall, Essex; Finlay Campbell, Brantridge Park, Balcombe, Sussex; L. A. Macpherson, Wirley-Grove, Pelsall, Staffordshire; Purvis Russell, Warroch, Milnathort, Fifeshire. The Grays Hall flock was descended from a choice lot of Negretti Merinos, consisting of four rams and forty-six ewes, imported from Spain in 1791 by George III. The Brantridge Park flock was begun in 1885 by the importation of ten ewes and two rams from New South Wales, the direct and pure-blooded descendants of the famous Camden stud flock, which was formed by blending the blood of a number of Merinos imported into that colony from the Cape in 1797 with a selection made in 1804 from the royal flock above referred to. The ancestors of the Wirley Grove flock were imported from Canterbury, New Zealand, in 1887, and an offshoot of the flock has been established with success, at an elevation of five hundred and fifty feet above sea-level, at Corrimony, twenty-four miles from Inverness.

Much valuable information regarding the character of the Merino when bred in this country has been provided by the history of a flock of about four hundred pure bred Merinos, which was kept for a period of thirty years, ending about 1870, by Thomas Drewitt & Sons, auctioneers, Guildford.

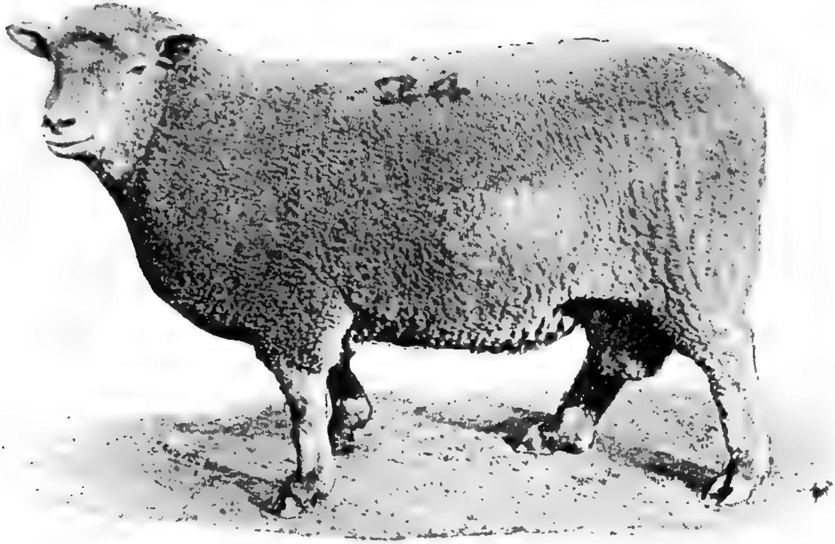
It is generally supposed that Merino wool is liable to degenerate when grown in this country, but the concensus of opinion of those who have personal experience is against this view, if care be taken in breeding, and if the animals be not forced with rich food. Samples submitted to experts in the wool trade in London have been pronounced equal to the best class of wool of New Zealand growth in respect of quality, density of staple, and growth. There is also a decided prejudice against Merino mutton imported from the Argentine Republic, and from Australia and New Zealand, owing to its dark colour, especially after it has been frozen, and thinness as compared with that of the carcasses of home-fed British sheep. Merinos are undoubtedly chiefly famous for wool production, and they are slow in coming to maturity for the butcher, the mutton being prime at three years old, but at its best when produced on natural food the mutton is not inferior to that of our mountain breeds. Crossing with most of our early maturity breeds has proved successful in hastening maturity in the produce.

A very successful cross with Cotswold rams has produced the **Metis-merino**, which is now quite famous in France, both as a mutton and a wool producer. Successful experiments in crossing have been carried out in this country with the Lincoln, the Leicester, the Shropshire, the Romney Marsh, the Cheviot, and the Scotch Blackface. The last is a hardy cross, yielding both mutton and wool of excellent quality, and with a little artificial food during winter it thrives admirably on mountain pasture. The weak point of the Merino breed, as a general purpose sheep, is its slowness in maturing its mutton, but this is a defect for the remedy of which strong inducements are offered in connection with the colonial and South American mutton trade with this country.

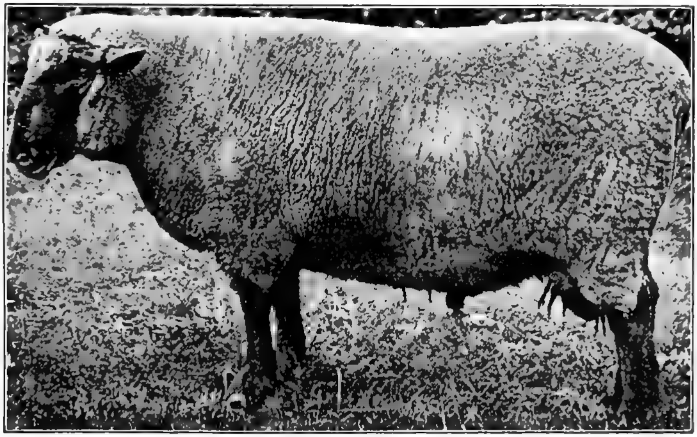
Short-wools: all Hornless except where stated.

The Sussex or Southdown is the breed through which all the other Downs have been formed, by crossing it with the old-fashioned varieties of the different districts. It is short-legged, and in all respects most compact and symmetrical, but particularly good in the hindquarters. The present improved and peculiarly handsome form of the breed has been attained by selection from the original stock, which was light in the forequarters, and leggy.

The head is small and neat, woolled close up to the ears and on the forehead; naked ears are most objectionable. The hair on the face and legs is of a grey-brown colour.

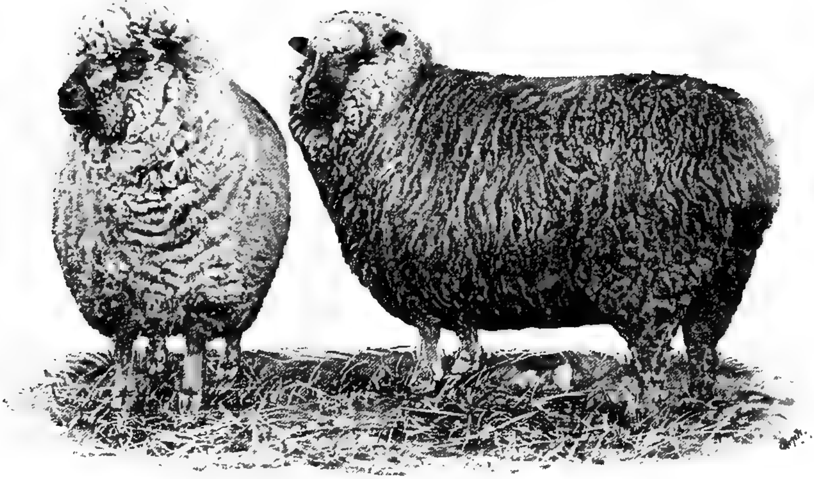


A.—SOUTHDOWN RAM, "No. 24."
Bred by HUGH PENFOLD, of Selsey, Chichester, sold in 1888 for 185 guineas.

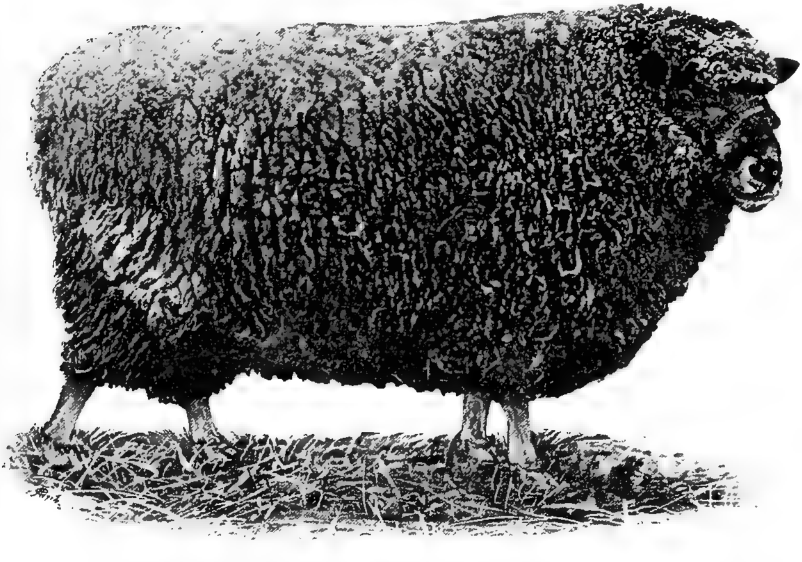


B.—HAMPSHIRE SHEARLING RAM, "KEMBLE" OR "VICTOR IV"
Champion in 1891.
The Property of ROBERT COLES, The Grange, Warminster, Wilts.

Plate LXIII.



A.—Shropshire Ewes.
The Property of Edward Caddick, Caradoc, Ross



B.—Shropshire Down Ram, "Webton Prince."
The Property of Edward Caddick, Caradoc, Ross.

The fleece is short, close, and of fine quality, and should be free from hard projecting fibres; that from a ewe weighs from three to four lbs. Open, long, coarse wool has been imported into some flocks in the attempt to increase the size by crossing, and it is very objectionable. Any darkness or dulness in the colour of the skin when the wool is parted is also an objectionable feature in the show-ring.

The flesh is of excellent quality, but it can be easily made too fat. The average weight for well-kept tegs should be about 18 lbs. per quarter at twelve months. The offal, as compared with that of other breeds, is little in amount. Fat wethers rising two years old, belonging to Earl Bathurst, and sold in Cirencester market in the first week of December 1884, dressed to 138 lbs. per carcass, or 34·5 lbs. per quarter dead-weight, and yielded 65·83 per cent. dead-weight to live-weight.

The original habitat of this breed was the region of the low chalk-hills of Sussex and the neighbouring counties. Away from this they are usually kept as ornamental sheep in parks, where they are at times made into five-year-old mutton. They are not good rent-payers, except in their native district, being too small, and also liable to foot-rot.

The Shropshire Down breed of the present time has been produced by crossing the old form with Southdowns to give quality, and with Leicesters to maintain the size. Now any importation of blood is objectionable, as it leads to divergences from the true type.

Points.—The face is longer and larger than that of the Southdown; the nose slightly Roman; and the ears larger, and showing a more sprightly appearance. The face and legs are of a blackish brown colour; the latter often darker than the former, which is usually tinged with grey (more at some seasons than at others) round the nose and eyes, and on the jaws. White spots on either face or legs are objectionable, and black spots on the body are equally so. Transparent ears are bad, showing a deficiency of the necessary hairy covering, and a tendency to softness, probably induced through in-breeding.

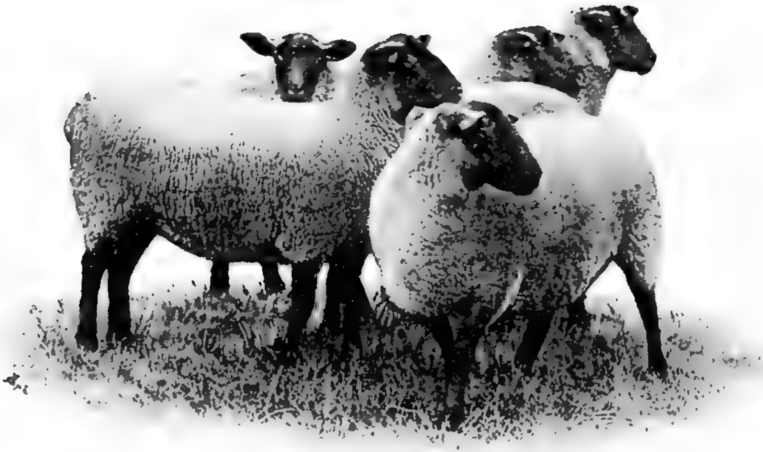
The wool should be free from black, of fine quality, and closely set, although a little longer than Southdown; and the skin underneath ought to be a uniform pinky flesh-colour. A good average weight for a fleece in an ordinary ewe flock is 7 or 8 lbs.; those of ram tegs and highly fed ewes more: but heavy "clips" of wool are frequently coarse.

The dead-weight is usually about 20 to 22 lbs. per quarter at twelve months old.

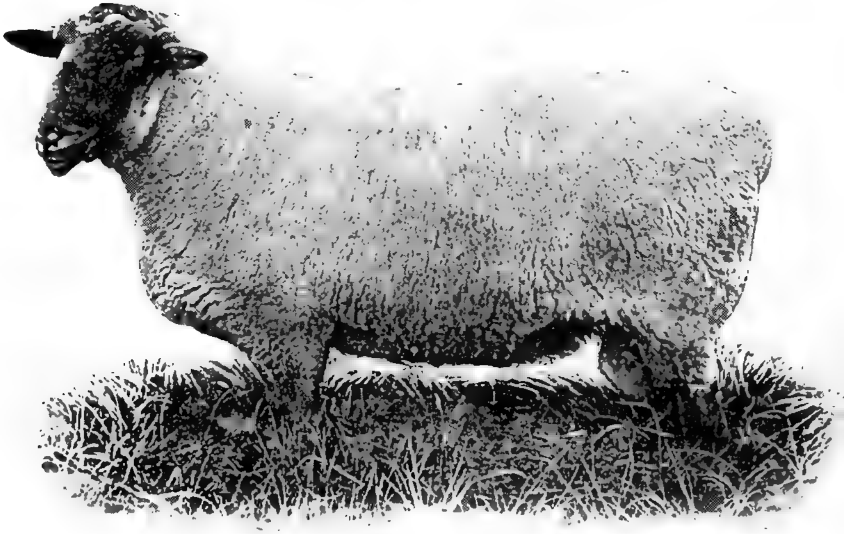
This breed has spread quickly in England within a few years, and they were extensively tried in Scotland (about 1884) to cross with the native sheep. The crosses, like the pure breed, are remarkably well covered with flesh on the back, and make excellent fat lamb, as they come forward early, but they have not been a success when kept till spring as hoggs, being much smaller in size than the Leicester crosses, which they were expected to supersede. Another disadvantage of the Shropshire used in crossing with sheep on hill pastures is that the lambs are too bare for the first few days after birth, so that they cannot resist the cold in very stormy seasons.

The Hampshire Down breed has its natural habitat on the chalks of Hampshire and the region lying immediately north and west; hence called the **West Country Down.** It was formed by crossing the old Wilts and Hants sheep with the Southdown and by selection.

It is larger, coarser-looking, and lower-set than the Shropshire, and when young not easily fed to "handle fat," though often forced to great weights by high feeding. Ewes are frequently allowed one lb. per day of a mixture of equal parts of linseed cake and peas or Egyptian beans, until the lambs begin to eat; then this is gradually taken from the ewes and given to the lambs. With abundance of natural



A.—SUFFOLK EWES.
Won a number of First Prizes.
The Property of JOSEPH SMITH, Thorpe Hall, Hasketon, Suffolk.



B.—SUFFOLK RAM, "SAILOR PRINCE."
Winner of many First Prizes, and a Champion Prize in 1888.
The Property of EDWARD GITTUS, Snailwell, Suffolk.

food in addition to the concentrated mixture, a ram lamb may increase from 19 lbs. at dropping in January to 150 lbs. live-weight on 1st August. Lambs can be got early, as the ewes come in season sooner than most other sheep. If kept for tegs in an ordinary way, they should weigh 20 to 22 lbs. per quarter at thirteen or fourteen months old. The mutton is of fine quality, and all over firm to the touch.

Points.—The head should be large and free from "slugs," "snigs," or budding horns, with a strong Roman nose: the faces and legs almost black; light faces indicate recent crossing with the Southdown. The wool should be free from black patches, and grow close up to and round the ears, close and fine over the body, and shed white, with a pink skin underneath. The average weight of fleece is 4½ to 5 lbs. for ewes.

The ears are of a good size, more pointed than in the Southdown, of a dark mouse colour behind, and free from light specks.

The forequarters are particularly good, and the top of the shoulder extremely broad. A conspicuous defect in ordinary specimens of the breed is a falling away behind the shoulder.

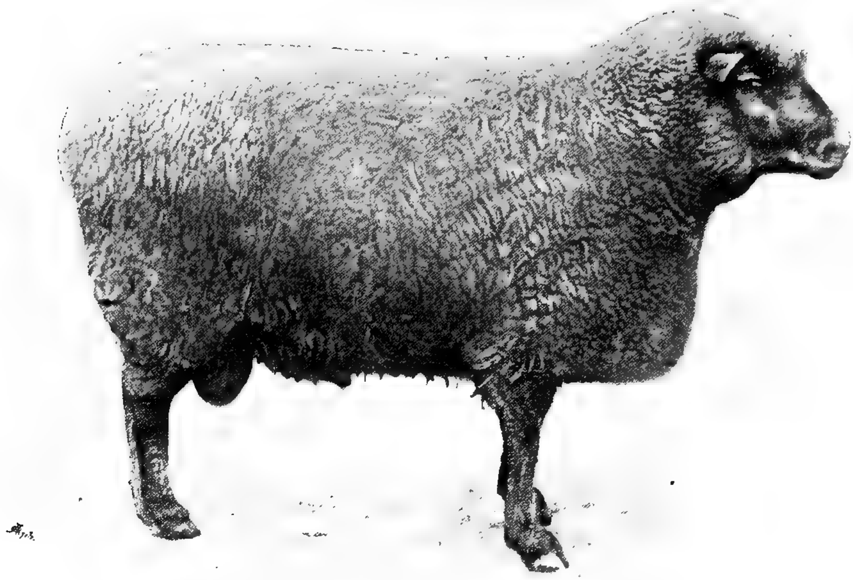
The Suffolk is a hornless breed, which resembles the Hampshire, but it is not quite so compact and low set; and the short hair on the face and ears is black, and extends down the back of the head, so that the ears are not surrounded with wool as in the case of the Southdown.

It was bred originally from the hardy, horned, black-faced Norfolk sheep, by crossing with the Southdown to give symmetry of form, compactness, and early maturity, and also with the Hampshire, to maintain size and weight. The breed is mentioned in "The General View of the Agriculture of Suffolk" as far back as 1797. Some pure-bred flocks of the present day date back to 1810, which throws light upon the fact that recent attempts at the importation of foreign blood into the breed have not proved successful. Those in the eastern districts partake strongly of the old Norfolk characteristics, viz., dark face, light bone, and active habits. Those to the west are, as a rule, kept on better land; they have lighter faces, greater aptitude to fatten, and grow to greater weights.

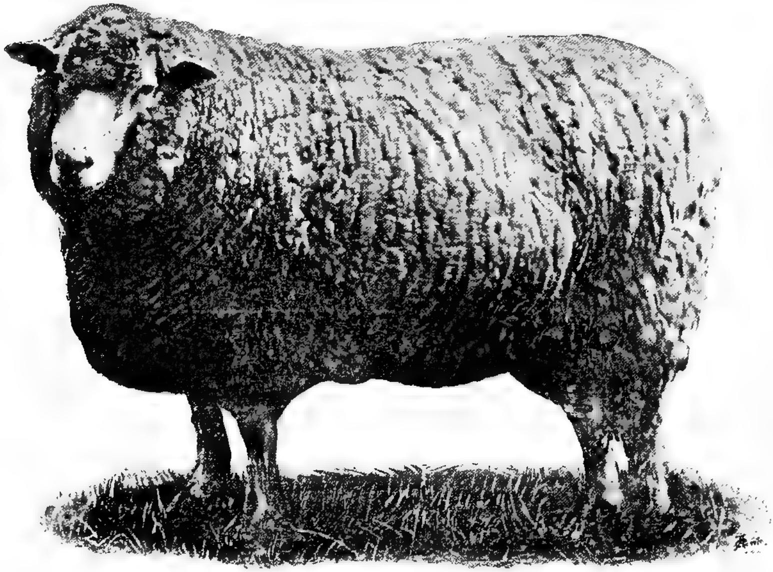
The Suffolk breed was not recognised as of sufficient importance to form a class at the Royal Agricultural Society's shows until 1886. Since that time it has made rapid strides in advancement. A Suffolk Sheep Breeders' Association has been organised with the object of protection and improvement. The animal they have under their care is possessed of great strength of constitution, distinctive characteristics, and abundance of bone and flesh; and the objects before them ought to be to equalise and refine the type by judicious selection.

It is claimed for this breed that it excels in the following particulars,—

In fecundity, to the extent of producing thirty lambs to the score of ewes; in **early maturity,** as if fed on good grass, tegs are ready for the butcher at ten or twelve months old, and the ram lambs are so large and well developed that they are often preferred for breeding purposes to older sheep; in **hardiness,** as the sheep have not been pampered, and will find a living on bare pastures where most other breeds would starve. **The mutton** is very fine, possessing an exceptionally large proportion of lean meat. It commands the highest prices in the market. **The constitution** is unusually robust and hardy, the animals possessing great power of endurance when driven long distances. Their being almost exempt from foot-rot has raised their reputation as good "rent payers," and has led to their being substituted for "half breds," at one time so largely kept in the marsh land districts.



A.—OXFORD DOWN RAM, "LIVERPOOL FREELAND."
Royal Winner in the Two-Shear Class in 1885, and Champion of all breeds at the Oxfordshire Show.
The Property of JOHN TREADWELL, Upper Winchendon, Aylesbury.



B.—RYLAND RAM, IN FULL WOOL.
The Property of FRANK SHEPHERD, The Brook, Colwall, Malvern.

The Oxford Down is a breed comparatively recently formed by crossing Hampshire ewes with Cotswold rams. It is the largest Down, although Hants tegs, being dropped sooner and being consequently older, weigh more at the London Christmas fat shows. The mutton is of good quality, the quarter weighing 20 to 23 lbs. at twelve to fourteen months old.

Points.—The face is not so dark, nor the shoulder so broad, as in the Hampshire. The type is not so well defined, showing more of the crossed origin. Rams from old-standing flocks cross well with hill-breeds and inferior sheep, but breeding from the produce of a recent cross is not to be depended upon.

Flocks of cross ewes are sometimes kept for breeding fattening tegs. When they become light faced after frequent crossing with the Cotswold, a pure Hampshire ram is turned in for a year, and when rather dark a Cotswold is used in preference. A Shropshire ram on a cross ewe produces a sheep with a much better covering of flesh along the back than the Oxford Down will do.

Oxford Down wool is longer and more open or loose than that of other Down sheep—in fact it ought in reality to be classed as long wool; fleeces of ewes average 6 or 7 lbs. each.

The Clun Forest Breed belongs to the Clun district of Shropshire, the south of Radnorshire, and the adjoining portions of Montgomery. It is sometimes called in these localities the Radnor-forest or Kerry-hill sheep. It is bred from the tan-face sheep that at one time abounded in that region, by crossing with hardy Shropshire and black-faced Longmynd mountain rams. The Longmynds have been quite supplanted by them. The ewes are excellent mothers; crossed with a Shropshire ram they produce Easter fat lamb, which would weigh, if kept till early summer, 17 lbs. to 18 lbs. per quarter. Ewes and two-year-old wethers rise in weight to 28 lbs. per quarter. The wether mutton is sold in the "West End" as Welsh, dressed with a tuft of wool on the tail, which is left its full length on account of the breed being semi-mountainous.

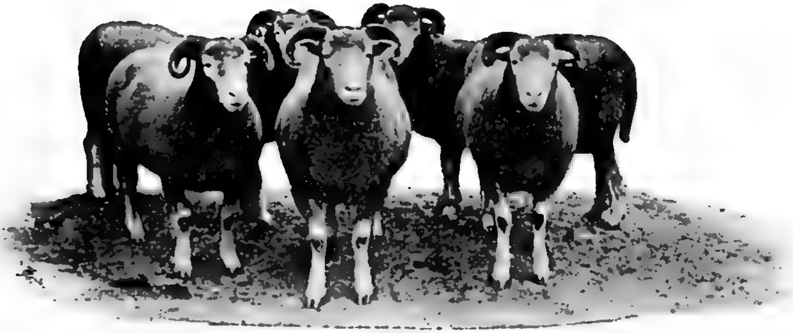
The wool is about the same weight as that of the Shropshire down, but a little coarser.

The Dorset and Somerset Horn is a white-faced breed, with a close short fleece weighing 4 or 5 lbs., and a tuft of wool on the forehead. The nose, hoofs, and legs are white. In size it is larger than the Southdown, compact, and well proportioned.

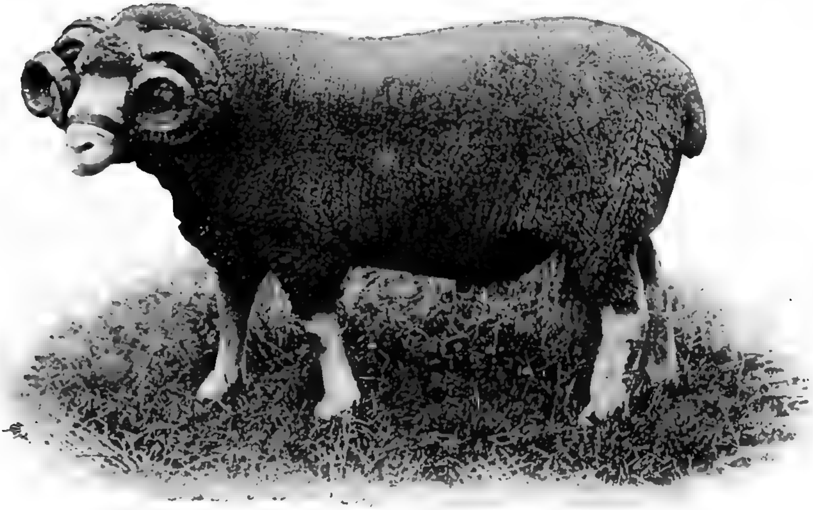
The great peculiarity of the breed is, that the ewes take the ram as early as April, and breed "house-lamb" ready for Christmas. They also take the ram again soon after lambing, and thus two crops each year may be got, though it involves special precautions. The ewes are often tupped for the last season by a Southdown ram, so that the lambs become ripe sooner, and possess dark heads with no horns. Downs or Down-crosses are usually supposed to give the best quality of mutton, and there is consequently a run upon dark faces and legs, as butchers can more easily dispose of the mutton of dark-faced sheep.

The Ryeland Breed (named from the Ryelands of Hereford, a poor upland district) is perhaps one of the breeds of longest standing in England, resisting, as it does, any attempt at improvement by crossing with other breeds. It is compact and hardy, and fattens readily, when liberally fed, up to 20 lbs. per quarter at twelve to fourteen months old. Pure-bred lambs and also crosses by a Ryeland ram on ewes of other breeds make excellent butchers' lambs. They are dropped in a fat condition, and when well managed they retain it in virtue of their natural hardiness of constitution.

Both rams and ewes are hornless, and possess white faces



A.—SOMERSET AND DORSET HORN EWES.
The Property of H. DAVIS, Preston Farm, Milverton.



B.—SOMERSET AND DORSET HORN RAM, "PRINCE."
First Prize at Plymouth in 1890.
The Property of HERBERT FARTHING, Thurloxton, Taunton.

and legs, and a tuft of wool on the forehead. The wool is short, and exceptionally fine in quality, and is more like the wool of the Merino than that of any other British breed. The fleece weighs about 7 or 8 lbs. on an average in the case of well-kept sheep. The breed is almost free from foot-rot, unless when this is communicated to certain of its members by contact.

The Ryeland sheep were supplanted to a large extent some years ago during the rage for Shropshire and other improved Downs, but the tendency of recent times has been to breed them up again, and greatly to improve upon the original form by selection. It is estimated that there are only about thirty flocks of Ryeland sheep in existence at the present time, twenty-five of which are located in Hereford and Brecknockshire, while perhaps two or three places may be found where they are bred in each of the counties of Monmouth, Gloucester, and Worcester.

MOUNTAIN BREEDS.

The Cheviot is named from the range of hills on the Scotch and English Border, its native district. The ewes pasture on the lower and less exposed green hills all over Scotland. Cheviot wethers and Blackfaced Highland ewes go to greater heights, or occupy positions on the black or more heathery land at lower elevations.

Points.—The face and legs should be well covered with short, hard, wiry, pure-white hair, which should extend over the ears and well over the back of the head.

The horns in the ram, though not always present, are not objected to, being considered a sign of hardiness, if "clean"—not thick and ringed or rough like those of the Blackfaced breed. The nose of the ram is somewhat arched or Roman. The nostrils are black, and the eyes dark, and very full and bright.

The wool is moderately long, and should be close-set, and neither open nor curly, but straight and free from "kemp" or dead hairs, covering all parts of the body well, including the belly, breast, and legs down to the knees and houghs. A good average clip for ewes is 4½ to 5 lbs. of washed wool.

The tail is long, and should be very rough. It is cut so that the point reaches the hough.*

The shoulders are high, and sharp at the withers.

The fashionable form of Cheviot is now shorter, smaller, and more compact, and the wool closer and thicker set than formerly, since a series of bad seasons, down to 1879, showed that the larger varieties with loose open fleeces were not so hardy. The old, original Cheviot was a very close-coated, short-woolled, and remarkably hardy sheep,—even more hardy, it is recorded, than the Scotch Blackfaced breed, a state of things which is now far from being the case.

The ewes are good milkers, if not starved, as they frequently are in bad seasons, when the natural food on which they subsist is late in springing.

Cast ewes fed on turnips for from twelve to fourteen weeks, and wethers from the hills at three years off, weigh, killed and dressed, 60 to 70 lbs.: wethers a year younger, and finished on turnips, get up to about the same weights.

Cast, draught, or cull ewes, at five years old, go from the hills into the low country and better food, to be "milled" or crossed with Wensleydale, Border Leicester, or Lincoln rams. The produce is called "Half-bred," or "Leicester-Cheviot," and those half-breds kept for ewes pro-

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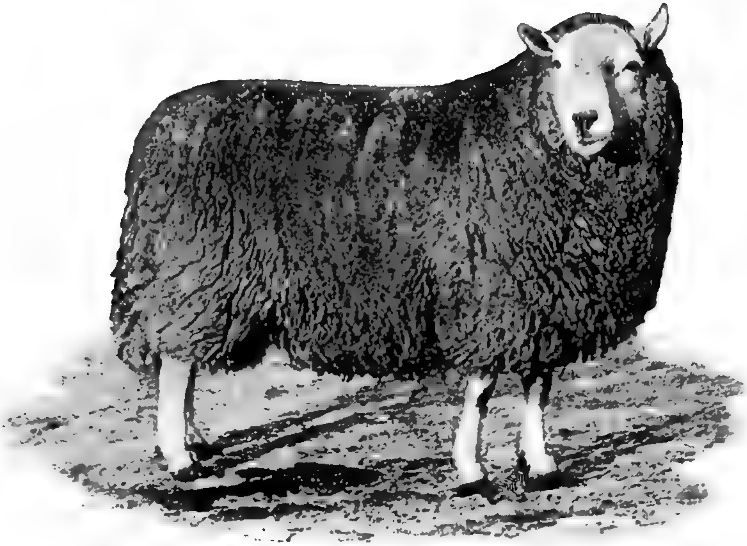
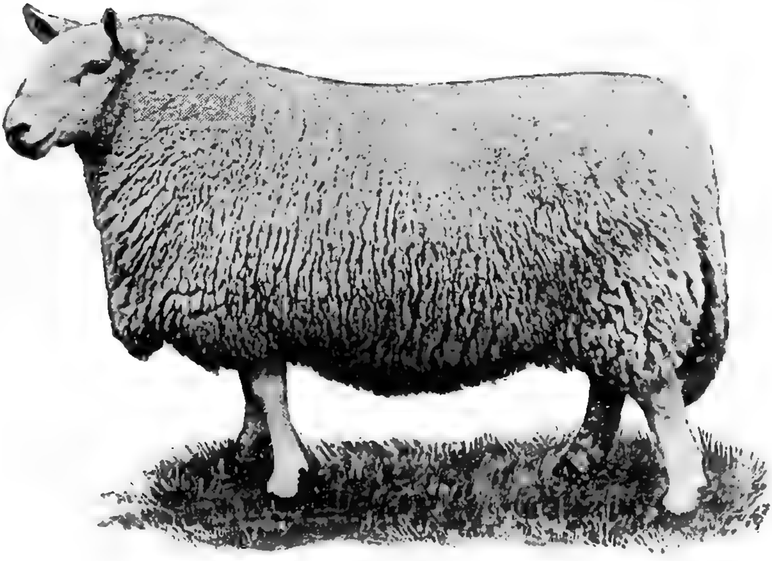
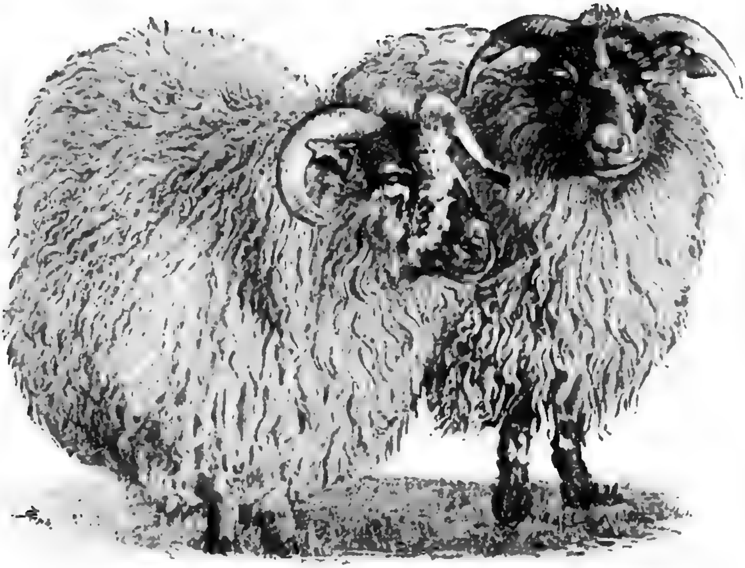
* The tails of mountain sheep are left long to protect the udders in cold weather, and because, on natural food, they are not so liable to scour and become dirty as sheep on turnips and luxuriant green forage. Shetland and Iceland sheep have not tails long enough to act as a protection, but there is an unusual amount of wool on the inner part of the thighs, which serves the purpose equally well.



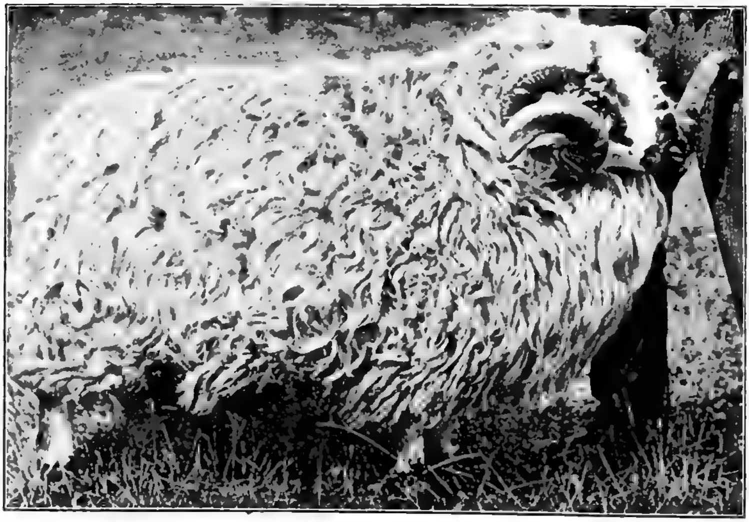
A.—AN EAST COUNTRY CHEVIOT RAM, "AIMFU SANDY."
In store condition, with a pedigree which dates back for 90 years.
The Property of JOHN ELLIOT, Hindhope, Jedburgh.



B.—A WEST COUNTRY CHEVIOT EWE—AS ONE OF A GROUP OF THREE.
The Winner of many Prizes, Highland Society and others, including a Champion Cup at Moffat, 1886.
The Property of J. A. JOHNSTONE, Archbank, Moffat.



A.—SCOTCH BLACK-FACED HIGHLAND EWES.
The Property of JOHN CRAIG, Innergeldie, Perthshire.



B.—SCOTCH BLACK-FACED MOUNTAIN RAM, "CIRENCESTER'S GRANDSON."
First Prize Ram above Two-Shear at the Highland and Agricultural Show, Inverness, 1892.
The Property of CHARLES HOWATSON, of Dornel, Glenbuck, N.B.

duce by a Leicester or Lincoln ram "Three-part-bred" lambs.

Half-breds, when fat at twelve to thirteen months old, weigh 16 to 18 lbs. per quarter, and the flesh is leaner and of better quality than that of the pure Leicester or Lincoln.

The Scotch Blackfaced Highland Breed is smaller than the Cheviot, much hardier, and thrives better on coarse pasture, such as black, heathery land.

The wool is curly, loose, and shaggy, hanging down nearly to the ground, and more hairy and kempy than Cheviot wool. It is specially valuable in the manufacture of coarse articles, such as carpets; and as it is less subjected to foreign competition than other wools, it fluctuates less in price. The fleece averages 3½ to 4½ lbs. from ewes, and is usually clipped unwashed. Much is exported to America when the price does not exceed 6d. per lb., as then it can be imported under a much smaller duty than higher-priced wools. Black or blue spots on the neck, tail, or other parts of the wool-producing portion of the skin of a Blackfaced sheep are objectionable.

Points.—The face and legs are black or mottled (but the colours should be distinct, clear, and free from dun or brown), smooth and glossy, and no wool among the hair, although the remains of a tassel on the forehead and a fringe on the legs has often to be dressed off well-bred sheep in preparing for exhibition. The nose is strong and prominent, and the nostrils are wide and black.

The horns of the ram are large, coming out level from the crown of the head, and not rising above it or joining together at the base, but taking one or more spiral turns according to age. The corkscrew-like curl of the horn is in a forward direction, and should so incline that room is left between the horns for the face.

In the ewe the horns are small, thin, flattened and curved, but not spirally twisted.

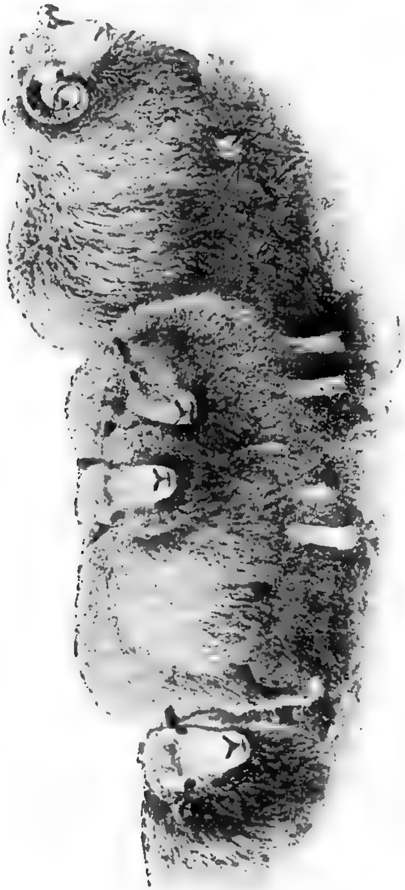
The ears are short and small, but hidden by the horns in the ram, and not much looked to in judging. The back is broad all the way along, including the shoulder tops. The tail is naturally short, not often hanging lower than the hough, and it, consequently, does not require to be cut. Old ewes should have rough tails, as when they lose the wool and become "whip-tailed" they are not worth so much in the market.

The mutton is of the finest quality, especially that of three-year-old wethers, or young and tender lambs. A fat wether from the hill at three years off should weigh 16 to 18 lbs. per quarter.

The "Blackfaced" sheep is wild and active, and when thriving best must travel about a great deal, a habit which suits it to its native pastures better than to a low country district, where it is liable to be affected with foot-rot. The breed is supposed to have come originally from the Ettrick Forest.

The produce of a Blackfaced ewe by a Leicester ram is called a "Cross" or "Mule"; and by a Cheviot ram a "Half-long." The latter name is given because a Blackface is sometimes termed the "short" sheep, and a Cheviot the "long" sheep. As ewes these sheep of mixed breed are good milkers.

Milk-sickness in Lambs is found in upland districts in Scotland, where there is an abundant supply of "draw-moss"—the sheathing cotton sedge, *Eriophorum vaginatum*. The malady appears early in May, soon after the lambing season begins, and continues with greater or less severity till the end of the month, being most deadly in good growing seasons. At times as many as one-third of the lambs born on one day will die. However plentiful and good grass may be in June, the evil influences which are liable to be exerted when the sheep are feeding freely on draw-moss do not appear, consequently late lambs rarely



Herdwick Ram, "Disraeli," and Ewes.

Many Prizes.

The Property of James Spencer, Murrah Hall, Penrith.

suffer. The disease appears in the case of lambs of about two or three days old in the form of inflammation of the stomach, and they die in convulsions within a few hours. The *post-mortem* appearances are different from those present when **lambs "burst"** after taking too much milk, as they are liable to do on rich low country pasture. *The remedy* for milk-sickness is to give one teaspoonful of whisky in a teaspoonful of water twice daily for three days, the ewes which have not lambed being " shed in," so that the work of treating every lamb under three days old may be made possible. There is not much chance of the remedy being successful after the symptoms appear, and no hope of natural recovery.

It is a useful precaution, as a means of prevention, to turn out the rams a week earlier than usual, so that a large number of lambs may be dropped before the advent of the most dangerous season.

The Herdwick Breed is the hardiest of hill sheep, and is found in greatest numbers on the mountains of Cumberland and Westmoreland. A few flocks have been taken to Wales and other parts, and there is a distinct tendency towards the increase in the total numbers of the breed.

It is recorded that the Herdwick was brought to this country about the time of the Spanish Armada, and that " forty small sheep managed to save themselves from the wreck of a Spanish vessel stranded on the sandy coast of Drigg, and were claimed as jetsam and flotsam by the then lord of the manor."

From these foundlings or castaways the breed of the present day is supposed to have been descended. Any attempt to cross the Herdwick with other breeds with the object of improving it has been unsuccessful.

Points.—Horns may be present or absent in the ram, though they do not exist in the case of the ewe. They are rather appreciated, though not considered essential in the case of the ram.

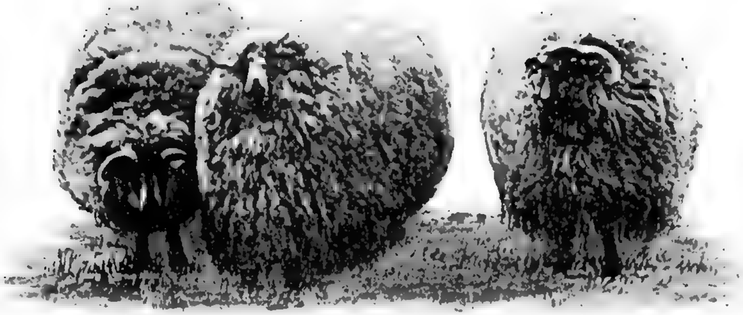
The colour of the heads and legs of the lambs when dropped should be black, with the exception of a white tip to the ears, and possibly a fringe of white hair round the hoofs. The white gradually extends from the starting points indicated, and forms a ring which develops round the muzzle, till at three years of age the face is left either white, like the hoofs, or steel-grey in colour. These colours should be free from spots or speckles, or from a brown tinge. The wool is strong and coarse, and inclined to be hairy at the top of the shoulder. The poll should be well covered with wool, and the forehead with the forelock; the tail bushy and broad. There are some unique customs in the management of this breed which are not commonly met with among other breeds of sheep,—First, such as smearing the teats of the ewes with plasters of pitch to prevent the lamb sucking; second, painting the wool of the ram a bright red colour, so that the shepherd is enabled to distinguish him in uneven hilly ground, even three miles away, by the aid of a field-glass.

The wethers at three or four years old, and also the fat ewes, may weigh from 12 to 18 lbs. per quarter, and the mutton is of excellent quality.

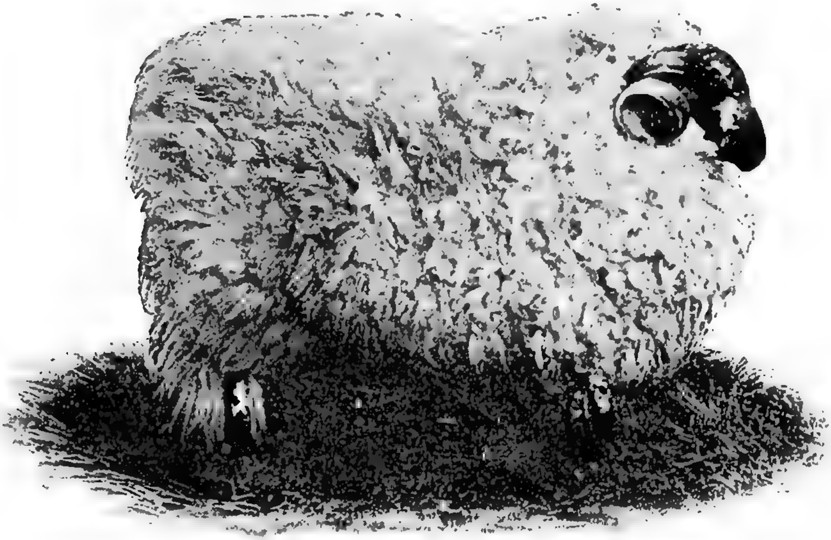
The Lonk Sheep is a native of the Lancashire, Yorkshire, and some of the Derbyshire hills. It resembles the Scotch Blackface, but is leggier, with a larger body and bigger head, a longer and rougher tail, and in the ewe stronger horns. In constitution it is not so hardy as the Scotch Blackface, but it has a shorter, closer, finer, and heavier fleece, which weighs 4½ to 5 lbs. in the case of ewes kept in moderate condition.

The rams have been used to cross with Scotch Blackfaced ewes to increase the size and improve the wool, but the attempt has not succeeded, as the constitution of the produce is weakened. The fat-weight is slightly more than that of the Highland Blackface.

The Limestone Breed has only recently attracted



A.—TWO-SHEAR LONK EWES.
The Property of Mrs DAWSON, Weston Hall, Otley, Yorkshire.



B.—TWO-SHEAR LONK RAM, "CAPTAIN."
The Property of Mrs DAWSON, Weston Hall, Otley, Yorkshire.

general notice, although it has existed for many years as an important local variety.* The home of the breed embraces some eight parishes or townships on the dry limestones in the lower districts of Westmoreland, only a few townships being in the higher parts of the county. It also extends to a limited extent to the Derbyshire hills.

Points.—Both males and females are horned, and the faces, legs, and wool are white. The wool is very long, and it is finer in quality on the forequarters than on the hindquarters. The breed possesses a noble carriage. It is very hardy and active, and admirably suited to mountain climbing, though on dry lowland pasture it thrives well and reaches its maximum size.

There has been little or no change in the characteristics of Limestone sheep from time immemorial. The attempt to introduce sheep of other breeds from other parts of the country, usually by strangers coming to settle in the district, has failed, the native dry, heaths, or bare mountain pastures being unsuitable to any but the Limestone breed. On the other hand they do badly on wet and spongy land. The ewes are most prolific, and will readily cross with rams of other breeds, but it is then necessary to bring them in from the heath not later than the beginning of October. They make good mothers if not interfered with, but if approached or handled they are liable to become petted, and even to run away from their lambs. Shearling wethers on ordinary pasture will weigh 18 to 21 lbs. per quarter dressed at nineteen to twenty months old, and highly fed cast ewes have run up to 28 lbs. per quarter. The outside show of fat is not so good as in the Lincoln and Leicester breeds, but the quality of the mutton is unequalled by that of any English breed except that of the Herdwick and the Welsh mountain sheep. The ewes resemble the ewes of the Dorset breed, in that they come in season at almost any time, and consequently may be used for the production of Christmas fat lamb.

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* The father and grandfather of R. Parker, Moss End, Burton, Westmoreland (who has been good enough to supply valuable information regarding the breed), bred Limestone sheep on the same farm for nearly one hundred years.

The Welsh Mountain Sheep.*—This breed has existed on the Welsh hills, it may be said, from time immemorial. On the highest hills the original breed still exists in its pristine purity of blood, though in the lowlands, including the richest pastures of the country, the breed has been increased in size and modified to some extent (though the general characteristics have been well maintained) by crossing with various larger early maturity breeds. The improvement of the breed has been restricted by the fact that many of the mountains are common pastures, where it is impossible to secure united action on the part of the various owners of stock.

The crossing of a mountain breed of sheep with an improved early maturity breed, which invariably possesses a less hardy constitution on that account, can only be regarded as an improvement when it is possible to place the mountain sheep in a position in which it will be independent of severe weather and scarcity of food, which, by the application of Darwin's law of the survival of the fittest, exercise an immense influence in forming the character of a mountain sheep.

The characteristics of the pure breed are a yellow face and legs, short fine wool, and usually a narrow body descending towards the shoulder. The rams possess gracefully curved horns, while the ewes are generally hornless. The breed is noted for hardiness and activity, which renders it difficult to fence those which are taken down to the lowlands to feed. The mutton in the London

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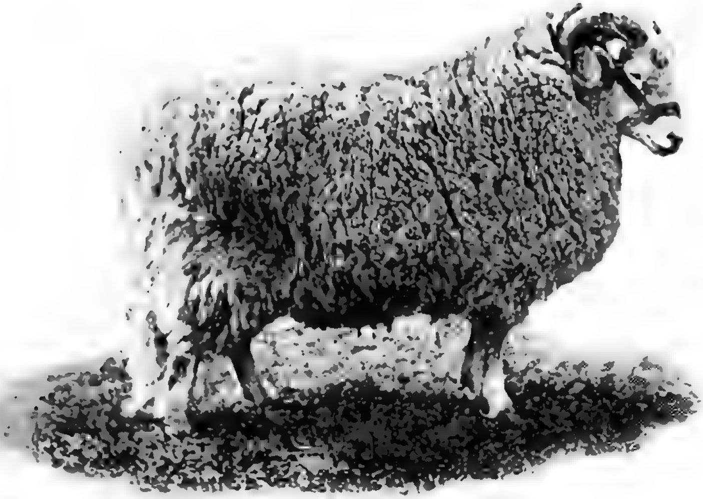
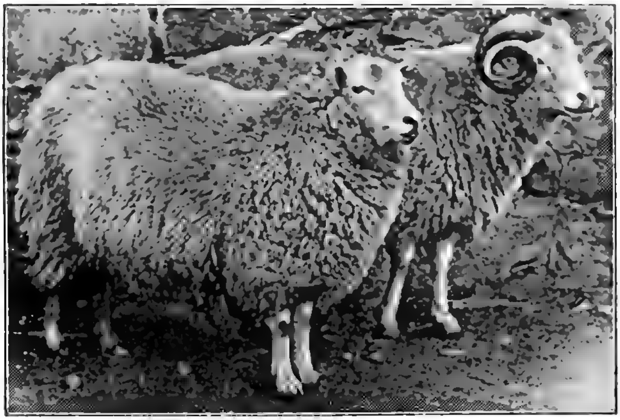
* The Author is indebted for much of the following information to Owen Price of Naubyrham, Cray, Brechen, and Professor Gilchrist, Bangor.



A.—IMPROVED WELSH MOUNTAIN RAM, "BRHENIN CYMRU."
First Prize Royal Agricultural Society's Show, Warwick, 1892.
The Property of JOHN JONES, Central Buildings, Llandudno.



B.—WELSH MOUNTAIN RAM, "GLYDER," AND EWE, "GYNFFON-FAWR."
The Property of THOMAS ROBERTS, Tan-y-fynwent, Aber, near Bangor.

market is regarded as of the finest quality, and classed with Scotch mountain mutton and that of the Southdown.

The dead weight of the real pure-bred Welsh sheep does not exceed 28 to 32 lbs., but specimens, the "improved" variety, run up to 36 or 40 lbs., and on the best pasture four or five year old wethers even weigh 50 lbs.

The influence of crossing has been to produce thicker sheep of "square" and equally balanced frames, which in suitable localities, where turnips and other artificial food can be conveniently provided, return more profit than the pure breed under liberal treatment. The great differences in size and appearance are accounted for by the different breeds used in crossing. In some places the Radnor Forest sheep has been employed for the purpose. In Anglesey and South Carmarthenshire, where the largest sheep (running up to 15 and 20 lbs. per quarter) are to be found, Leicester and Lincoln blood has been introduced; and on the highest hills in Breconshire the Cheviot cross has proved to be hardy and suitable to the surroundings.

The weight of the Welsh fleece differs with the size and character of the variety of the breed producing it, from 2 lbs. up to the weight of the larger English Down fleeces, the staple of the improved specimens being longer and more open as well as more heavy.

The russet-rooted wool called *gwar goch*, which may be seen in lambs in front of the top of the shoulder, may be eliminated by careful breeding. The famous Welsh-flannel, Welsh-shawls, and woollen goods of various sorts (with which the names of Owen, Owen, & Co. are familiar), are made from those parts of the fleece which yield the finest of wool fibre.

The mountain flocks usually range on the hills from April to November, but they are brought down to the lower land during the winter months. The ewes are not sent back to the mountains after they are four years old, but are crossed usually with a Shropshire down ram with the object of producing fat lambs for the May market.

The Tan-Face is a very old Welsh mountain breed, still met with, but in smaller numbers than formerly, in Radnorshire, about Abbey-cwm-hir * and St Harmon, and shown as a distinct class at the Radnorshire Agricultural Show annually held at Pen-y-bout. This is a short-legged, hardy little sheep, with a close fleece of fine wool on the back and sides. but rather coarse underneath.

Exmoor Sheep somewhat resemble Dorsets, but are more hardy. They have white faces, with black nostrils, and the horns slant farther back than in the case of Dorsets. The wool is close and fine, weighing 4 or 5 lbs. a fleece. Exmoors are larger than Welsh sheep, while the mutton is also very good.

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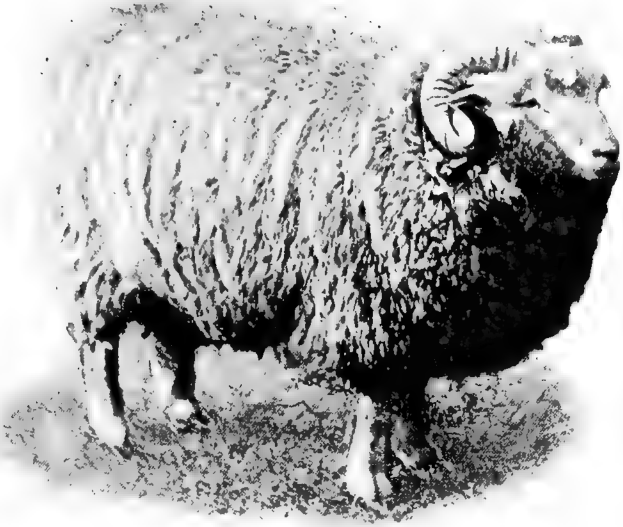
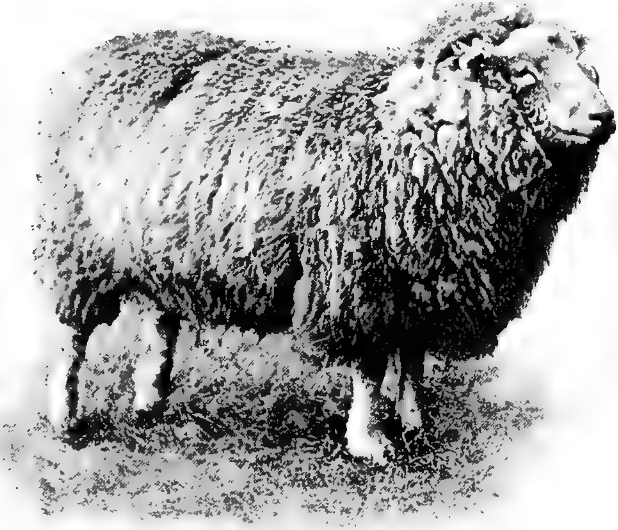
* Cwm-hir (pronounced *coom here*), Welsh for long-valley.



A.—EXMOOR RAM.
The Property of Sir WM. R. WILLIAMS, Bart., Heanton, Barnstaple, North Devon.



B.—EXMOOR EWE.
The Property of Sir WM. R. WILLIAMS, Bart., Heanton, Barnstaple, North Devon.

CHAPTER XVIII.—MANAGEMENT OF SHEEP ON CULTIVATED LAND AND LOW COUNTRY PASTURE—THE EWE AND LAMB.

Tupping Time—Winter Pasture—Ewes not in Lamb—The Lambing Pen—Parturition—Early Treatment of the Lamb—Food of the Ewe—Lambs' Food—Castration—Washing—Shearing—Weaning.

"TUPPING" **or "Ride" time** commences usually, where the climate is moderate, about the first week of September, or at any later period, varying with the district, till about 22nd November (Martinmas), when hill-rams go out to the ewes. The date is often governed by the time the ewes begin to come in season: for instance, Hampshires will tup in the beginning of August, whereas mountain ewes frequently do not begin to stand to the ram before the end of October.

Cast ewes (four-year-old) and "culls," or those unfit for breeding, are "drawn" out when the lambs are weaned, or at any more suitable time before the ram is put amongst them. By being kept on good food, such as rape or mustard, for ten days before tupping time, ewes get into an improving condition, and in consequence produce more doubles. The object may also be accomplished, if the green food cannot be had, by giving each one ½ lb. of oats daily.

Too much care cannot be exercised in arranging the ewes and rams according to their different qualities and characters, so that the flock may maintain a definite type of its own. One ram to sixty ewes is the usual proportion, but he may be allowed a greater number if he be kept apart, and a "chaser" or "teaser" lamb, with a cloth sewed on his belly, put out to find the ewes as they come in season.

A shepherd should notice if ewes "come back" to the ram at the end of sixteen days. The usual mechanical way of finding this out is to use three colours of paint, say blue, red, and black. The breast, or sometimes the inside of one fore-leg of the ram, is first rubbed with blue for rather more than two weeks. Red is used for the next period of sixteen days, and black for a third period. The ewe's rump is thus marked while being tupped, and according to the colour of the last marking the time of lambing is approximately predetermined. A ewe marked twice should be put to another ram for a third trial, as she is less likely to hold to the first ram than to another. This is most easily accomplished by running several lots of ewes with the accompanying rams together. At the end of six weeks, when the tups are taken up, the ewes should run over stubbles and poor pasture, or follow fattening sheep to pick up what remains of turnips or other rejected food: they should be kept thriving, but must not be made too fat.

Ewes going on pasture during winter should have an allowance of ½ ton of roots per hundred per day till lambing begins; and after they have lambed, 1 ton per day, or 22·4 lbs. each, along with 1 or 2 lbs. of hay or good oat straw in racks. This allowance should be slightly increased should snow cover the ground. Ten days before lambing begins each ewe should have ½ lb. daily of a mixture of concentrated artificial food,—such as crushed peas, Egyptian beans, and cake, with oats (whole), and bran, varying in relative proportion to one another, and also in quantity, to suit the condition of the bowels. Heavy milking ewes, such as those with double lambs, should have this concentrated food increased, but not more than 1 lb. each per day. The mixture is gradually reduced as the lambs learn to eat and become less dependent upon their mothers. Some farmers provide no extra food, and others give too much, and set it down to bad luck if the lambs do not thrive. It is a mistake to have breeding stock either too fat or too lean: they are then less prolific and there is more risk of their producing small-sized young, and moreover they have less milk to support them. On an ordinary farm, twenty-five lambs to every twenty ewes is a good crop, thirty lambs being more than an average. With extra care in management, and by breeding only from ewes which have been born twins, even thirty-five, or in the case of small and exceptionally successful flocks, even forty lambs may sometimes be got.

Sheep not in lamb (eild) may be noticed near to or in lambing time by the following signs—

1. By their jumping and playing in good weather:

2. By being less bulky than the others in the region of the abdomen:

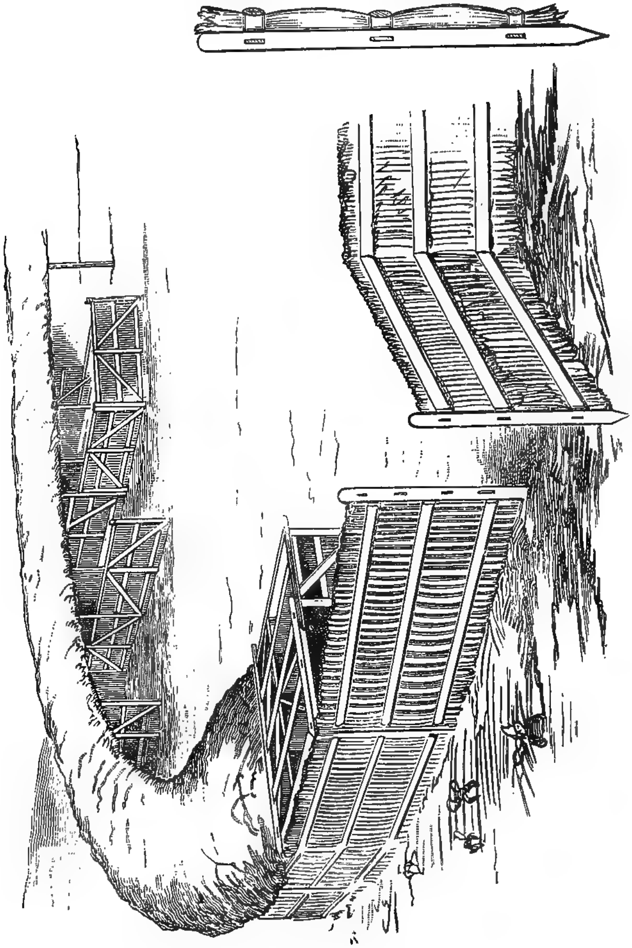
3. By no lamb being felt when the ewe is turned up, and the tips of the fingers pressed against the lower part of the belly:

4. By having no "show" or increase in size of the udder:

4. By the appearance on the bare skin about the udder of a considerable amount of yellow waxy excretion which does not look as if it would naturally clean off: and

6. By the wool near to the udder being more firmly attached than the wool of a pregnant sheep.

The lambing pen is an open, well-littered yard, often erected at a suitable spot in a field of roots, and constructed of hurdles thatched with straw to provide warmth and shelter for the young lambs in stormy weather. It should be placed on dry ground, having a southern exposure, in a sheltered place if possible, and on a slope sufficient to let surface water readily escape. Small covered pens, each about 4½ feet square, are ranged round



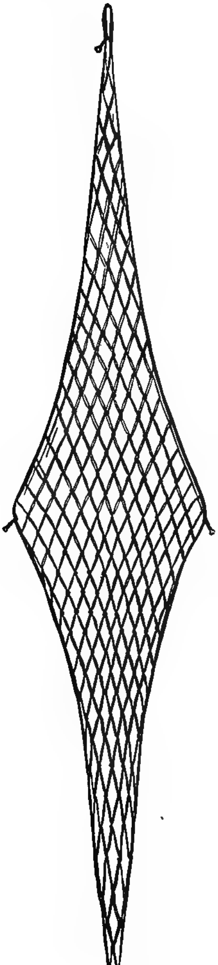
View of One Side of a Lambing Pen.—*After a sketch by Commander M. J. Harrison, R.N.*

the north, east, and west sides, at the rate of thirty to thirty-five for two hundred ewes. The cost of the labour of erecting a lambing pen of the size named is from £2. 10s. to £3.

Ewes "coming near their work" are brought in at night, so that they may be more carefully tended. Ewes do not lamb so frequently at night as late in the evening and early in the morning, and lambing is easier in moist than in dry weather.

The period of gestation in the case of ewes is between twenty-one and twenty-two weeks. The shepherd should live in a wooden house on wheels, fitted with a stove, and placed close to the pen to enable him to give his undivided attention to the flock.

During parturition assistance by hand should never be given too soon. Should the head of the lamb protrude, immediate action is necessary to prevent its death by strangulation. When parturition is normal the two fore-legs appear first, then the head. A steady pull by the legs is usually successful help. In false presentations large lambs require to be turned right round before they can be got away. Turning is most easily accomplished when the ewe is suspended by an assistant holding her by the hind legs. The hands, after washing, should be rubbed over with carbolic oil, one part of pure carbolic (Gresser's or Calvert's, not the crude or brown carbolic) to twenty of sweet oil. Half an ounce to one ounce of the mixture should be put into the vagina afterwards, to prevent inflammation (the result of injury, or the presence of putrid matter, as when the lamb is dead), which induces "straining." Inversion of the uterus (commonly called the "lamb-bed," or in Gloucestershire the "wither" or "wether") is thus prevented. When protrusion occurs, the exposed part should be washed with tepid water (cold water is liable to give pain), and pressed gently back into its proper position, with the hand held flat, care being taken not to pierce the organ with the fingers. The oil should in such a case have a few drops of laudanum in it to help to soothe and to allay the irritation. To retain it in its position, a 1-inch mesh-net made of strong twine may be put on the top of the wool round the hips and covering the tail, the ends passing along the sides of the animal, and terminating in fastenings to a rope tied round the heart-girth after the fashion of the cow-breeches already described at page 148. If a net is not at hand, locks of wool may be tied tightly across from hip to hip, or the lips of the vulva may be stitched together. The last, though successful, seems a cruel and drastic remedy, but it should be remembered that while the womb protrudes the pain is acute, and the life of the animal is in danger.



NET BREECHES FOR A EWE.

The Early Treatment of the Lamb.—When it is necessary to bring lambs that have been chilled into the house, they should not be placed near a fire, because a sudden change of temperature gives an injurious shock to the nervous system, which may result in physical collapse, or even in death. Cows' milk, given at blood heat, 98° F., without water, should have in it a little gin or sweet spirits of nitre to aid urination. Stricture of the neck of the bladder, the result of exposure to cold, is most common in male lambs, and is relieved by providing shelter, and gently rubbing the belly with the hand while the lamb is held up by the fore-legs.

A motherless lamb, while young, should be fed five or six times a day to prevent scour. The giving of a little cows' milk to a lamb while it is sucking its mother often induces diarrhœa or constipation, and in cold weather results in the development of swelled and stiff joints.

In "twinning on" a second lamb to a ewe which has lost her lamb, the skin of the latter may be put on the living lamb for a few hours to give it the smell with which the ewe is familiar, and by which she is able to distinguish her own lamb if she has been allowed to lick it. Should she not have smelled or licked it, another lamb may be at once substituted for the dead one without any further precaution than that of rubbing its body over with the slime adhering to the skin of the dead lamb. Whisky rubbed on her nose and on the lamb soon after lambing, when the instinctive fondness for the young is strongest, temporarily suspends the ewe's power of scent sufficiently to deceive her.

The Food of the Ewe.—About the end of March or beginning of April, ewes on arable land in the Midland Counties and south of England are removed from around the ewe-pen, where, to encourage the flow of milk, they have had sprouting white swedes, or late-sown green-round turnips, which stand the winter well. The lambs are allowed to run before the ewes, and thus to secure the best of the young sprouts, by the hurdles being made so that they can pass through while their mothers cannot.

One acre (15-ton crop) is usually set aside per week during winter for every two hundred ewes, or 24 lbs. each per day. Shelter can be readily provided when necessary by thatched or wattled hurdles set up to form a cross, thus +. The ewes are run for a week or ten days on early pasture ("seeds"); next for three weeks on rye, which ought to be finished before the end of April; then on clover, vetches, or some other forage crop; swedes or mangels follow; and later on, to give a change of food, cabbages are thrown to them while at pasture in the field.

The practice of training **Lambs** to eat cake early is most important in feeding for fat lamb. Lambs are taught to eat cake and corn before being weaned by enclosing their troughs within hurdles, through which they alone of the flock can pass.

Store male lambs are castrated at two or three weeks old; but not during frost, which would induce stiffness; nor in a hot sun, which might cause excessive bleeding if the testicles be removed by pulling. Lambs on rare occasions faint after castration, but soon recover consciousness. Marking, by taking nips from the ears, if not done previous to this time, is also now performed; while the tail too is docked to keep the sheep clean, should the solid excreta at any time become abnormally soft, as is frequently the case when lambs are put on luxuriantly grown food produced on naturally rich or highly manured land, or when lean sheep of any age begin to improve rapidly.

There are three common ways of Castration:—*First*, The scrotum or purse is either slit or the top cut off by a knife, and the testicles are drawn away by the teeth of the operator: *Second*, By iron clams and the actual cautery after the scrotum has been cut into; if a lamb is stiff next day it should be bathed with hot water in the region of the wounded part: *Third*, By hazel-wood clams dipped in powdered sulphate of copper, after being spread inside with lard, placed so that the neck of the cord supporting each testicle is gripped and thus fixed on for half-an-hour. This stops the circulation of the blood in the parts involved, and prevents bleeding after the testicles have been cut away. The top of the scrotum is removed in this instance, as the operator has then greater freedom in adjusting the clams than when slits are made.

This last way of making the incision possesses also the advantage of providing a free passage for the escape of

PLATE LXXIII.

THE OPERATION OF SHEARING BLACK-FACED MOUNTAIN SHEEP AT OVERSHIELS, STOW, N.B.

humours, which form in the wounds during the process of healing, though on the other hand it reduces the size of the purse, which is a disadvantage for marketing when the animal is ready for the butcher. The two latter methods are not so liable to produce inflammation, and there is no danger, as in the case of drawing the testicles, of rupture, or bleeding in the region of the kidneys, causing a lamb to pine more frequently than to die immediately after the operation. The third method is the safest, but it takes much more time in execution than the others. It is the most suitable when well-developed lambs or old sheep are castrated.

Washing, which should be done ten days before clipping, is usual in the case of most Lowland breeds of sheep, though it is not practised with the Scotch Blackfaced breed. It is never done in salt water, as this injures the wool for keeping in store. There ought to be a watertight box in the centre of the pond for a man to stand in while doing the washing, in place of his having to get into the water. The washer takes hold of a sheep and keeps it moving in the water until the "yolk" or "eik" is washed out. This yolk, which keeps the wool soft and greasy to touch, is an excretion from the skin chiefly, but possibly also to some extent from the wool itself. It contains much potash, and is used in the manufacture of fancy soaps. It is most abundant on certain strains of the Merino breed. Hill sheep, such as Cheviots, are simply thrown into a large pond and made to swim through it once or possibly twice; but since the price of wool has been so much reduced, the operation has become less general.

The time of Clipping or Shearing is dependent on the weather, and, in the case of lean sheep, on the "rise" of new wool. Unless for special purposes, sheep are clipped in the new growth of wool.

Eild sheep, or those not giving milk, are shorn first: from the beginning of May onwards, in the south, and ewes three or four weeks later. Exposure to cold by early clipping greatly diminishes the flow of milk, and might also cause death in some cases from inflammation.

The new wool left upon breeding ewes or sheep in poor condition is not so close as that of fat sheep, and consequently not so effective as a means of protection. Show sheep if clipped early require to be kept under cover. Fat sheep clipped for the spring market have by law woollen sheets put on them if the weather be at all cold, and neglect to comply with this regulation is punishable by a fine.

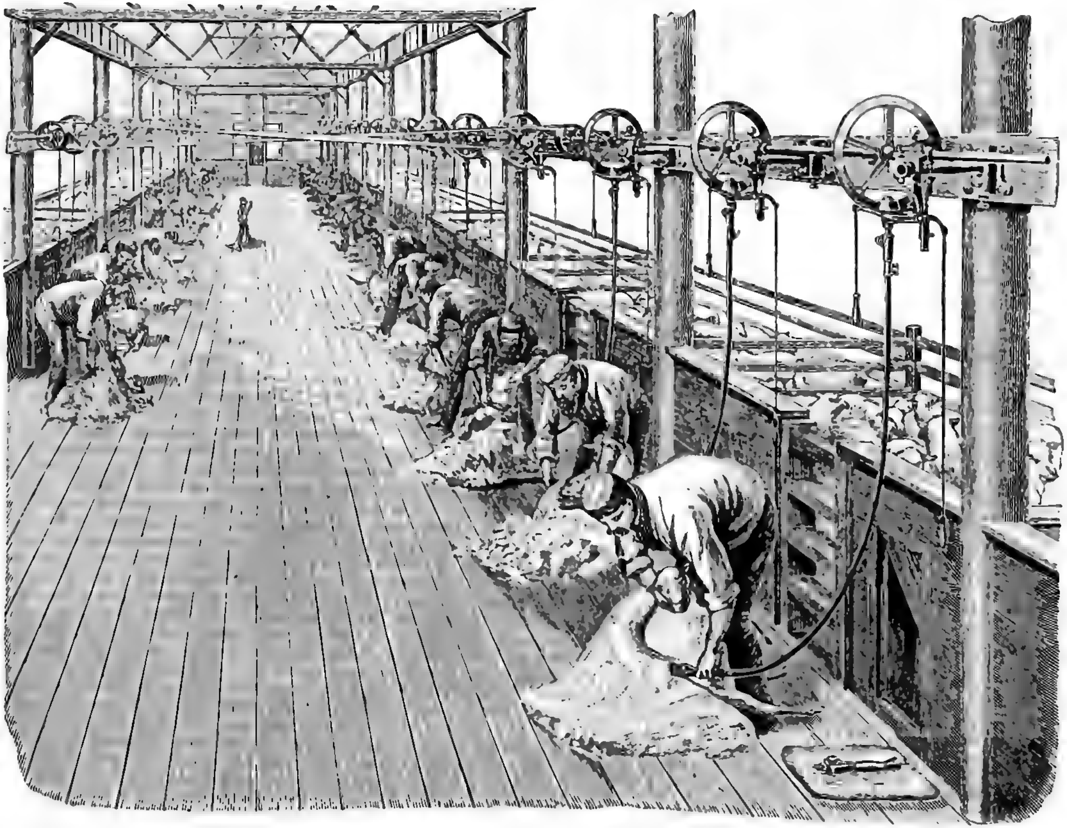
Lambs are not shorn the first year, except in a few districts where they are highly fed, and are of a good size when summer arrives.

Twenty-five to thirty stock sheep of a large breed is a good number for a man to clip in a day: the cost averages about 3s. per score when done by piecework. If the shearer is restricted to twenty per day, as in the case of fat sheep for market, which require to be clipped over the back and to be done bare and well, the cost is raised to 4s. per score.

Shearing by mechanical means is becoming general in our Australian colonies, where the numbers of sheep are counted by tens of thousands, and where labour is not only expensive but difficult to control. As shearing-machines become more simple, better understood, and less expensive, they will secure a footing in this country. A gang of men might carry their appliances with them, and contract for the shearing of numerous small flocks in the same district.

The great difficulty to overcome is that of securing the power sufficient to drive a limited number of shears at a moderate cost, as there is not enough of work to employ an ordinary steam-engine with the limited number of hands which are brought together at the shearing of an ordinary flock. The Priestman oil-engine, which has now been brought to great perfection for the execution of light work,

PLATE LXXIV.



WOLSELEY SHEEP-SHEARING MACHINE AT WORK.

would supply sufficient power at a minimum cost to the ordinary farmer who is desirous to establish a set of shearing plant of his own.

The **advantages** of the shearing-machine over the hand-shears are (1) an increase of work done, by some 20 to 25 per cent.; (2) unskilled labour can be employed at a cheaper rate; (3) more wool can be removed; (4) the work is more uniform; and (5) no injury is done to the wool by making double cuts, which shorten the fibre and increase the amount of waste in manufacture. The Wolseley machine, which is shown in the accompanying plate, was the first to come prominently to the notice of the public, but there are now a number of patentees of machines which differ in minor details, but are in certain broad principles like the pioneer machine. Mention may be made of the "Silver" sheep-shearer, which is making its way in the colonies, and of "Burgon's" machine, which was exhibited at the Royal Agricultural Society's Show at Warwick in 1892.

Each machine is driven by a flexible shaft, making from 2,000 to 3,000 revolutions per minute. The cutter is nicely adjusted to a comb, in the manner of the comb-like cutting teeth of an ordinary hand horse-clipping machine, and moves from side to side 4,000 times per minute over the comb, which rests upon the skin of the sheep, and threads its way among the wool close to the surface of the body. As the points of the cutter are protected by the comb, it is much less likely to cut the skin; yet the machine does cut it if care be not exercised, and the skin be not pulled level.

Before the workman lets the sheep escape, it is usually "buisted" or **marked** by a large iron letter dipped in hot (but not quite boiling) Archangel tar, darkened in colour with a little lamp-black. As the wool grows pretty long, these markings become first indistinct and then unreadable, and paint or red keel, after being mixed with water or linseed oil, is rubbed on some part of the wool. Paint mixed with oil is less bright at first, but it is the more durable of the two.

After all visible and removable impurities such as dung (" clarts ") are removed, each fleece of wool is carefully rolled inside out into a bundle, except in such cases as that of Scotch Blackfaced wool, which is turned the other way. The neck end is last rolled on, and, to tie the whole together, it is made into a band by twisting. The wool should be at once, while warm, packed in strong canvas bags or sheets, as the operation is then more easily and better accomplished.

Certain lands and climates produce better and finer wool than others, whatever be the breed of sheep. Rich and also heavy soils produce strong wool; light soils, as Down lands, wool of a finer quality.

Wool "wauks," "mats," or "felts" (*i.e.*, sticks very close together) on the backs and necks of lean sheep in wet winters, and is thereby lowered in value. The best wool is got from sheep that are kept constantly thriving; there is then no break in the fibre, such as takes place when sheep get very poor in condition.

Weaning, in the South of England, is done about the beginning of May and onwards; in the North, the time is the end of June and the beginning of July and even later. Lambs should have their pastures frequently changed, if turned out in a field "at the breadth," and should never follow ewes or other sheep, as they pick up parasites which have been dropped by their predecessors, and are seriously injured thereby. Sheep thriving badly from ordinary causes, such as grass-scour, may almost invariably be "set going" by a change to sainfoin, in those districts where sainfoin flourishes, or by the addition of a moderate allowance of cake or corn to the natural food. Ewes immediately after weaning, with the extra feeding discontinued, are run over the poorest and barest pasture to dissipate the milk, which, unless precautions are taken to prevent it, is liable to cause swelling of the udder for a few days. It is quite unnecessary to milk ewes at this period by hand, as was at one time the custom even in hilly districts. Ewe-milk cheese, of a rich green colour, and of very fine flavour, was at one time largely made in this country; but, as ewes were milked from behind, the operation was not one of the cleanest either for the milker or for the product.

When lambs are to be fed on a bulky well-grown forage crop, as clover, rape, or vetches, they should at first go on for a few hours each day, and be turned out for a time into a grass field at night. This should also be done in wet weather if possible, especially if the land is at all heavy. There is risk of hoven, which may end fatally, if lambs are suddenly put on wet clover; or of impaction, developing into "stomach staggers," if the clover be very dry, or if there be not a proper supply of water. Sheep, contrary to a common erroneous belief, drink freely in dry weather, and those giving milk more than others.

CHAPTER XIX.—MANAGEMENT OF SHEEP CONTINUED—FEEDING.

Penning of Sheep on Roots and Forage Crops—Troughs—Urinary Disorders—House Feeding—Amount of Food—Experiments by Lawes and Gilbert—Calculations of Yield per Week according to Food consumed.

SHEEP **in the south are closely penned** between two sets of low hurdles, the first being moved forward at least once a day, and those behind every second day. The grass on any given part is thus consumed at once, and, if properly attended to, it need not be eaten so closely as to injure the crowns of the roots to the detriment of future growth. It is then left to spring afresh without any further bleeding and the consequent check of growth, which ensues each time it is nibbled by sheep. When the crop is of a moderate size, larger breaks are given, and the hurdles are not so often lifted. In Scotland and the north of England, sheep run unrestricted over the whole field at once. No doubt this is more wasteful of food, but there is little expense for attendance, and moreover Scotch sheep are more active than the representatives of the large English breeds, and require to be at liberty to move freely about.

Fattening tegs, and on arable farms stock tegs, go on to soft turnips, such as whites and greystones, in the end of September or beginning of October, and in a few districts even earlier. If not quite ripe, turnips ought to be pulled a few days before the sheep reach them. This makes them sweeter, and helps to prevent indigestion, which shows itself in the outbreak of scour, and in an increased death-rate. Soft turnips are followed in order by yellows, green-rounds, swedes, and by mangels in spring and early summer. Roots, unless when thrown on the grass in spring and summer, should, as a rule, be cut and fed from troughs, as they go further, and the practice pays in the end. If tegs are made to bite turnips, they break their milk incisor teeth in frosty weather, and cannot then feed satisfactorily. A mixture of concentrated artificial food (bruised cake and grain) prevents scour and various other ailments in fattening tegs. It is best to begin with a small quantity, and to increase to about ½ lb. at the New Year (average ¼ to ⅓ lb.), and then to increase in the proportion of ½ lb. per 100 lbs. live-weight till the time of sale. Concentrated food is advantageously and conveniently mixed with chaffed hay or straw. One ton of hay may be set aside per acre of roots,—that is, 1 ton of hay to 15 tons of roots, or an allowance of a little over 1 lb. of hay per sheep per day.

Turnip-troughs should be almost square in cross-section, and ample in size. There should be for the "artificial food" a second set of troughs which do not require to possess such capacity; the cross-section of the latter might be in the form of a right angle. Troughs, when not in use, should be turned over with the mouth down to keep them clean and dry. A length of 8 inches to 9 inches is the necessary allowance of trough-space for each sheep, in the case of the larger breeds. As sheep range themselves on both sides of the trough while feeding, each will thus have at least 18 inches of space or standing room. One man can easily cut roots for, and take full charge of, a flock of two hundred sheep, or attend to four hundred if the roots are not cut.

Stock tegs should have little, if any, artificial food, which, if given in quantity, injures their constitution for breeding purposes.

Urinary disorders appear in some districts late in spring among sheep penned on roots, especially swedes and mangels. All the food then requires to be changed without delay, and linseed cake given, along with ½ drachm of nitrate of potash per day. And, to induce warmth, the back should be covered with a piece of strong canvas cloth, 2 feet to 2½ feet square, which has had boiled linseed oil brushed on one side of it to make it waterproof. The best preventive of this affection is a liberal supply of pure water, of which the animals will drink freely as the dry weather of spring comes on, and as the proportion of moisture in the roots decreases.

Sheep feed faster, especially in stormy weather, in a well-ventilated house or shed than in the open, but the cost of erecting houses is prohibitive, except in the case of rams or show sheep. When large numbers of sheep are kept together in a house, they are liable to take foot-rot. Under those circumstances it is well to have a platform, a few inches high, covering most of the centre of the floor, and to sweep it clean every day.

Two hundred sheep are as many as ought to be placed in one flock if fed on roots. In Gloucester and some other districts, where the sheep are heavy, that number would be advantageously divided into two or three lots by hurdles, or by a 4-inch-mesh wire-net. Recently an ingenious and handy adaptation of the "Corrimony" wire-fence has been added to the means for fencing sheep folded upon turnips.*

Amount of Food.—A Cotswold teg, or one of any of the larger breeds, from eleven months old (1st January) till fat, will eat, along with the other food mentioned, 24 lbs. of roots daily, if fed three times a day—younger sheep eat less in proportion to their ages. Lean sheep eat more in proportion to their weight than fat ones. A Cotswold cast ewe will consume up to 35 lbs. of roots per day.

* Invented by A. Walker, Stagebank, Heriot, N.B.

One average acre of turnips (15 tons) will feed two hundred sheep for one week, at 24 lbs. each per day.

Experiments by Sir J. B. Lawes and Dr Gilbert showed that Cotswolds gave the largest average increase per head per week and also per 100 lbs. live-weight. Cross-breds came next, then Hampshires, Leicesters, and last of all Southdowns,—the increase in all but the Leicesters being in inverse proportion to the quality of the mutton. Under cover, three sheep, of 100 lbs. live-weight each, consumed approximately the same amount of food as was consumed by two sheep of the same age and breed weighing 150 lbs. each. The mixture consumed per 100 lbs. live-weight per week was 4¾ lbs. cake, 4¾ lbs. hay, and about 70 lbs. roots = about one-seventh of the live-weight, after deducting the moisture of the food. The increase was nearly 2 per cent. live-weight = 2 lbs. per week for a 100 lbs. sheep. A usual increase is 1 lb. of live-weight to 8 or 9 lbs. of solid food, moisture being deducted. About 58 per cent. of the fasted live-weight of sheep, moderately fat, is butchers' carcass (Warington); very fat sheep give 6 to 8 per cent. more in the case of refined breeds, such as Southdowns. Lean sheep give about 50 per cent., and old ewes, unless of the more fleshy breeds in good condition, often little over that proportion. In ordinary sheep passing from store to fat condition, 68 per cent. of the increase is carcass.

The following calculation shows the amount of mutton produced from the food already recommended. The amount is reduced to percentage to correspond with Lawes & Gilbert's 8 lbs. or 9 lbs. dry food example. A little more food is allowed for sheep kept outside. This drawback is so far made up for by the advantage gained from giving a *mixture* of concentrated food.

Food per day, per 100 lbs. live-weight, would thus be

½ lb. cake and corn, 12 lbs. roots, and 1 lb. hay; or per week:—

3½ lbs. cake.				
7 lbs. hay.				
10½ lbs.	— 1½ lbs. moisture	(=14 p. c.)=	9 lbs. dry food.	
84 lbs. roots	—76½ lbs. do.	(=90 p. c.)=	7½ lbs. do.	
		Total,	16½ lbs. dry food.	

This should give 2 lbs. increase of live-weight = 1 lb. in 8¼ lbs. dry food.

By adding 50 per cent. to the foregoing figures, we get about what a Cotswold teg would do from 1st January till it is killed at thirteen to fifteen months old, when weighing 25 lbs. per quarter. With 150 lbs. live-weight the increase would be 3 lbs.; and if we apply the 68 per cent. rule in passing from store to fat condition, the dressed mutton would amount to about 2 lbs.,—a good performance per week for a sheep of one of the larger breeds.

Cost of feeding a Hampshire teg for sixteen weeks during the finishing process.

Food.	(1) per day.	(2) per week.	(3) in 16 weeks.	Price per ton.	Total cost.
Cake and corn.	½ lb.	3½ lbs.	½ cwt.	£6. 10s.	3s. 3d.
Hay.	1 lb.	7 lbs.	1 cwt.	£3. 5s.	3s. 3d.
Roots.	20 lbs.	140 lbs.	1 ton.	£0. 6s.	6s. 0d.
			Total cost for 16 weeks,		12s. 6d.

To calculate the return of produce from the dry food consumed, say an increase of 1 lb. of live-weight for 9 lbs. dry material eaten :—

Dry Matter—
In 140 lbs. of roots @ 10 p. c. dry, . = 14 lbs.
In $10\frac{1}{2}$ lbs. hay, corn, etc., @ 86 p. c. dry = 9 lbs.
Increase of live-weight.
Dry matter consumed weekly, . . 23 lbs. ÷ 9 = $2\frac{5}{9}$ lbs.

To find the yield of mutton :—

				lbs.		lbs.
100	:	68	: :	$2\frac{5}{9}$	:	1·74
		Percentage increase in finishing.		Live-weight.		Dressed mutton.

Weeks. lbs. Total return in 16 weeks.
Thus—Increase in 16 = 27·8 @ 5s. per 8 lbs., ... = 17s. 5d. (nearly).
Cost of feeding, 16 weeks, . . . 12s. 6d.

Net profit, 16 weeks, . . . 4s. 11d.

The calculation assumes that the cost of shepherding and the average loss from death are more than counterbalanced by the value of the manure produced.

The above figures do not show the actual profit to the farmer by the transaction, as much depends upon the cost per lb. of the flesh of the lean sheep when bought, and whether the purchase price was more or less than the sale price. Here again is to be seen the importance to the farmer of a knowledge of the live-weight, in place of trusting to his good luck to make a fortunate guess "by hand and eye" at the weight of the animals. The ordinary farmer only attempts this guess once annually, consequently he has little practice, and is most likely to make a mistake.

Sheep, either rough or clipped, are sometimes sold by the farmer to the butcher by the lb., "sinking the offal," viz., 6d., 8d., 10d., or 1s. per lb. of dressed carcass, according to the quality and range of prices in the market. The butcher gets the head, feet, skin, and intestines, including "web tallow," all into the bargain. The web tallow, or store of fat which surrounds or encloses the bowels and stomach of a fat sheep, often weighs 10 lbs. to 14 lbs., and in the case of the Down breeds even more.

CHAPTER XX.—MANAGEMENT OF SHEEP CONTINUED —EXTERNAL PARASITES.

Dipping—Ticks or Kades—Grass Ticks—Sheep Lice—Black Flies—Maggot Flies—Scab Mites—Winter and Summer Dips—The Dipper—Dipping Materials—Pouring—Smearing.

DIPPING is practised in accordance with the custom of the district at various times during each of the four seasons,—spring, summer, autumn, and winter,—on a dry day and when the wool is dry; for example, immediately after clipping, or, still better, a fortnight later, when the wool has grown a little, to enable it to retain more of the effective material of the dip: lambs should also go through the tank at the same time. Ewes and tups should either be dipped after tupping time or one clear month before it, in order to prevent "firing" the rams. The object of dipping is to ameliorate or prevent altogether the attacks of parasites, viz.,—the kade or tick, *Melophagus ovinus;* the grass-tick, *Ixodes ricinus* and *I. reduvius*, and perhaps other species; the louse, *Trichodectes sphærocephalus;* the black fly, *Anthromyia* (several species); the flesh or maggot fly, four species, *Musca Cæsar*, *M. vomitoria*, *M. canaria*, *M. cadaverina;* and the scab-mite or itch-mite, *Dermatodictes ovis*—an acaris.

Ticks (English), **Kades or Kaids** (Scotch), are slightly-flattened, six-legged insects, resembling flies without wings, which move about in the fleeces of sheep, and live by now and then biting and sucking blood. They may be kept under, if not got rid of altogether, by timely dipping. They are most abundant on sheep in poor condition, and during winter when there is little sun, as they do not then come to the top of the wool to bask and so get shaken off. On man they bite a few times and produce considerable uneasiness and itchiness, and then die.

Grass-Ticks (eight-legged) fix themselves by burrowing their heads into the skins of sheep and other animals, as horses, cattle, pigs, dogs, rabbits, and even men. They do not often move about, but after becoming fixed gorge themselves with blood drawn from the unwilling host, increase to the size of a large pea, and finally drop off into the grass to pass one stage of their existence independently of the animal. It is consequently impossible to destroy them altogether, or even to keep sheep quite free from them at all seasons on land where they exist. This is more especially the case in spring and sometimes in autumn, when the young ones which are about in the grass find their way to the hairy or woolless parts of the skin about the head, neck, and legs.

Sheep Lice are much smaller in size than the two pests described, and also much lighter in colour, except about the head, which is dark brown. They exist usually in greatest abundance on the head and hairy parts of the body, and produce great irritation, which prevents sheep from thriving. With a little care, and by adopting the comparatively new practice of dipping sheep over the head, they can be quite destroyed. Most well-managed flocks are free from them.

Black Flies, such as swarm in thousands about the hats and heads of people and the ears of horses in summer, do not bite, and cannot break the healthy skin, but live by sucking any raw surface, as an accidental cut made while shearing, or the crowns of rams that have been fighting. When very numerous they irritate and unsettle sheep, and prevent wounds healing, especially if these be about the top of the shoulder, where the animal can do little to protect itself.

Maggot Flies, sometimes called blue-bottle flies, do damage by laying their viviparous ova, during warm showery weather, on any part of the wool which has been wetted or soiled with solid or liquid animal excreta. In a few hours after the sheep are thus "fly-blown" or "struck," if the day be hot, the maggots are hatched, and immediately find their way to the skin, which they devour rapidly—growing in size and strength until they are able to cause death within a few days. The presence of maggots may be easily detected by the wool on the parts attacked becoming damp on the surface and dark in colour, and by the restless and uneasy movements of the sheep,—including turning round and attempting to bite the affected part, lying down often, then rising and running a little, and taking shelter away from the rest of the flock at the back of a wall or among rank undergrowth. A sheep may at times clear itself of its tormentors by rubbing in a loose sandy bank or scaur; but the shepherd has usually to dress each animal carefully, at least twice, with a strong smelling solution, which destroys the maggots without injuring the raw parts of the skin. No ordinary dipping material used for the destruction of the insect parasites previously described is strong enough to kill maggots. Sores should be kept soft and in a healthy healing condition by the application of carbolic oil. The spirit- or oil-of-tar is very useful, if there be no broken skin, to prevent a second attack in very bad cases, by sprinkling the top of the wool or any dirty part with it; but it darkens the wool, and it also causes much irritation on a raw or maggot-wounded surface. Maggot flies may be almost certainly prevented from striking the fleece if sheep are kept clean by clipping away all dirty wool in the region of the tail, and by dipping them at times with a strong smelling solution containing a quantity of carbolic acid and sulphur. When it is important to have the scrotum well covered with wool, as is the case in certain breeds of sheep, ram lambs are not kept in the dipping tank the usual time, as prolonged submersion has a tendency to make the wool fall off those parts. They are frequently not dipped in the usual way, but a concentrated solution of dip material, with a strong smelling fly-powder added, is rubbed over the backs with a Banbury brush. Sprinkling the backs with a mixture from a rose-can is a common practice when large numbers of sheep require to be protected. The sheep are first packed closely together in a fold, so that the dipping stuff when showered on cannot fall to the ground. Maggots have been known to effect great improvement in a bad case of foot-rot by feeding on the diseased part, but they require to be carefully observed, and their cleaning action stopped before they have gone too far.

Scab Mites are microscopic, and very much smaller than any of the other parasites. When they are present, patches of the wool become white, and the sheep by biting half-pull so much wool, leaving a rough and speckled surface. When felt with the hand there is a hard brittle scab on the skin at the roots of the wool. This scab must of necessity be cleared off to prevent the extension of the disorder, which is most contagious, and would ultimately prove fatal to life if not attended to. "The Highlands of Scotland," or north of the Forth and Clyde, was at one time the stronghold of scab. In some places it still lurks in this country. This is to be regretted, as it is possible to stamp it out, as has been shown by the energetic action of the Stock Departments of the leading Australian colonies where it has been completely eradicated. There is a fact indicating the possible existence of a dormant condition of scab, which has not yet been scientifically explained, and which should be interesting to farmers buying sheep from the Scottish Highlands, viz., that after a long drive or railway journey, where sheep are packed closely and heated, scab is liable to break out in a few weeks, although there may be no such thing visible in the flock from which they came. The rule is to dip Highland sheep about ten days after coming off rail, and then there is not the slightest danger.

The common winter dips are preparations of arsenic and other poisonous substances,—for instance, Bigg's dip is mostly sulphide of arsenic, got largely from the chimneys of chemical works. Commercial arsenic (As_2O_3), boiled with a little bicarbonate of soda to make it dissolve, does the work well, but hardens the wool. Oil, melted butter, or grease is used to counteract this action and to waterproof the fleece.

Summer dips mostly contain carbolic acid, with an admixture of sulphur, which smells strongly and drives off flies. Carbolic acid is not only able to kill the living forms, as other dips do, but also to destroy the eggs or "nits" by coagulating the albumen present in the substance of which they are composed. The so-called non-poisonous dips belong to this class. Bigg's and Cooper's are two dip compounds commonly used in summer. Most dips require to be dissolved in hot water, which is an inconvenience and an additional expense. Little's dip is an example of dips that dissolve in cold water, but these, as a rule (Blackie's dip being an exception), are more easily washed off the wools by rains than those which are sparingly soluble in cold water. Sheep affected with scab are dipped in a bath containing, in addition to the usual dip material, tobacco-juice and powdered hellebore-root which has been boiled for fifteen minutes.

A dipper consists of a fold, a tank, and a dripper. The tank may be built of bricks drawn with cement, and may have a concrete floor. The old-fashioned tub into which sheep are turned on their backs is a mistake. Heavy sheep are liable to be injured in lifting. The best form of tank is made wide enough to permit a sheep to swim through without being able to turn easily: a suitable size is 15 to 20 feet long at the top, 5 feet deep at the plunge-end and for one-third of its length, and then gradually slanting out to the dripper at the other or exit-end. Sheep are not lifted, but pushed forward and plunged one by one over the head. As they go in they close their lips, and on coming up swim slowly through. They should remain in the tank till the wool is thoroughly soaked. The men employed are liable to let them go too quickly, and one should be stationed at a convenient place with a forked stick to regulate the rate at which the sheep swim. The excess of dipping solution runs off the sheep to the floor of the dripper, and then back to the tank, towards which the floor of the dripper slopes. For a few minutes after dripping, to avoid poisoning the pasture, especially when an arsenic dip has been used, the sheep should go for a time into a fold, or bare paddock where there is no grass. The cost of dipping, which is usually done by contract in Southern England, is about 1d. each over a flock, including lambs. The cost of dipping material for Scotch sheep is from £5 per 1000 (or a little more than 1d. each) down to half that price, but large discounts are often given by some agents.

A home-made dip, especially intended for waterproofing the fleeces, may run up to 2d. per sheep, as follows:—

20 lbs. of a mixture of equal parts of soft soap and pitch-oil (the former boiled before mixing) at 2d. per lb. . . .	£0	3	4
10 lbs. tobacco powder at 7d. per lb. .	0	5	10
2 gallons Gallipoli oil at 4s. per gallon .	0	8	0
Cost of material to dip 100 hill sheep,	£0	17	2

The principle in pitch-oil is carbolic acid and some chemically-allied substances. The pitch-oil and soft soap alone make a good cheap summer dip. If used in spring the oil is liable to darken the colour of the wool, and reduce its value in the market.

Pouring is done by running a concentrated solution of, say, 5 gallons per score (against 20 gallons used in dipping) into "sheds" or partings made by the hand, at intervals, in the wool along the back, sides, and belly of the sheep. This is more effectual than dipping in a case of scab, but is more expensive, and unnecessary for ordinary purposes.

Smearing[*] with a mixture of equal parts of American or Archangel tar and grease, or better, butter, is a method of waterproofing the wool and destroying parasites that was at one time very largely and successfully practised in exposed hill districts, especially in the Highlands of Scotland. It encourages the growth of wool more than any dip yet used, but wool is now so low in price that the increase will not repay the extra cost of the operation, and many have discontinued it. It darkens the wool, and often gives sheep, especially if lean, a "back-set" until the tar rises a little from the skin. Smearing should not be practised before the middle of October, as a strong sun melts the smear, and it runs towards the points of the wool if it does not drip off, and moreover the sheep become fevered. In carrying out the process the smear should be laid well to the skin at the bottoms of partings made in the wool, and as little as possible on it. The usual practice in preparing the material is to thoroughly mix in a tub, a fortnight before the operation, as much as will be sufficient for forty mountain sheep, viz., 9 pints (Scotch[†]) of tar with 9 pints of butter, the latter melted to enable it to mix with the tar. Tar is a mild blister if applied alone to an animal's skin, and the grease is intended to dilute it. Hard grease, such as butter, also gives the tar consistency.

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[*] The Author is indebted for many of the facts on this subject to Stephen Brown of Killilan, Wester Ross.

[†] A Scotch pint is about equivalent to $\frac{3}{8}$ of an imperial gallon.

A man smears twenty sheep per day, and receives from 2s. 6d. to 3s. for the work, besides food. The cost of smearing sheep is nearly 10d. each, made up as follows:—

9 pints of tar at 8d.,	£0	6	0
40 lbs. butter at 6d.,	1	0	0
Labour at 3s. 6d. p. score, including rations,	0	7	0
Cost of smearing forty sheep,	£1	13	0

CHAPTER XXI.—MANAGEMENT OF SHEEP CONTINUED —INTERNAL PARASITES.

Internal Parasites—Tape-worm producing Gid—Liver-fluke producing Rot—Diarrhœa resulting from worms—Husk or Hoose.

INTERNAL **Parasites.** — Besides the external pests referred to in the last chapter, sheep are subject to numerous internal parasites. One stage of the development of *Tænia cænurus*, the tape-worm of the dog, is passed in the brains of sheep, causing "gid" or "sturdy." The remedies are of more consequence to farmers who keep lean stock, and to ram-breeders, than to those who can send without much loss an affected animal at once to the fat market. A ram that has been cured of "sturdy" is none the worse afterwards for breeding purposes. The seat of disease is on the surface of the brain, at its base, or, in the Author's experience, most frequently in the "lateral cavities." These cavities are situated one on each side of the forward brain, and there, in common language, a "water-bag," containing many young tape-worms, develops. This presses against the brain, causing absorption of the contiguous parts of that organ, and usually a thinning and softening of the skull in one or other of the hollows on the crown of the head immediately in front of a line drawn between the ears, where the skull is comparatively thin. Partial paralysis accompanies the later stages of the development of the malady, and the sheep becomes blind on and turns to the side opposite to that on which the "water-bag" inclines. Boring with a trochar and canula, to extract the "bleb" and its contents, is easy in such a case. When the seat of the disease is far back in the brain the skull is thicker over the affected part, and there is not sufficient time, before death is liable to occur, for the bone to become thin and soft by absorption. In Scotland this form of gid is known by the specific name of "thorterill." Piercing then leaves little pieces of bone, fractured from the skull, on the surface of the brain, which, although the disease may be cured, produce within a few days suppuration, which usually results in death. Principal Williams, Edinburgh, recommends in place of a piercer the use of a little circular saw, called a trephine, to remove a minute round piece of bone. The skin is bared from the skull immediately over the spot to which the movements of the sheep direct suspicion. All detached pieces of bone are washed carefully away before the membrane covering of the brain is broken. Piercing in the usual way through the brain to reach the bag is then done with comparative safety. In districts which are much subject to this disease, to ensure the destruction of the embryo worms the skulls of dead sheep should be broken up and buried with quicklime in a compost heap. The dogs ought also to be dosed regularly with ½ drachm to 1 drachm of areca nut, which frees them from tape-worms, and lessens the risk of sheep, while feeding on grass, picking up segments of the worms passed by dogs.

Liver Rot.—Though there have been enormous losses in this country from "rot" in sheep, the full bearing and nature of the working of the liver fluke (*Distomum hepaticum* or *Fasciola hepatica*), which is the cause of the disease, does not yet seem to be quite understood. These worms, which are seldom more than an inch long, are broad, thin, and flat, and attach themselves by a sucker on the under surface. Sometimes hundreds have been found in the liver ducts of one sheep. Professor Leuckart in Germany, and A. P. Thomas in this country, traced, almost simultaneously, the life-history of this parasite through all its different stages, and published independent accounts of their investigations in 1882.* They find that the fluke lives for a time, and changes its form, in the body of a minute shell-snail (*Limnæa truncatula*), which thrives in an excess of wet.

The sequence of changes in the animal system is originated by irritation, and consequent inflammation, beginning in the biliary ducts, and extending through the liver, interfering with the performance of its functions in aid of digestion. The stomach next becomes weak or disordered, poor and imperfect blood is formed, and time is all that is necessary to exaggerate the results into a persistent anæmia, which ultimately ends in death.

The great means of prevention are, to surface- or under-drain, and in stiff clays to lay the arable land up in high ridges to aid surface-drainage; to keep sheep from pasturing on flooded land; to have lumps of rock salt about the pasture; and to give liberal feeding. One fact in connection with this disease is not generally known, but is worthy of special consideration. The presence of flukes in the liver, even in large numbers, does not necessitate the appearance of the dangerous symptoms described. Few sheep are killed in Galloway, a large district in the south-west of Scotland, without flukes, frequently in large numbers, being found in their livers: yet death from "rot" to any extent is very exceptional. Rot certainly has done much damage, and will continue to do so on damp undrained land in wet seasons, but there are good reasons to believe that much of the death from so-called "rot" has been from a very different cause, which will be described under lung disease.

Scour or Diarrhœa in sheep, but more especially in lambs, is often caused by various parasitic worms attaching themselves to the inner surfaces of the stomach and bowels. There they set up irritation, and live by absorbing what ought to go to nourish the sheep. *Treatment.*—No better or effectual remedy can be had than one or two doses of turpentine. A sheep is very easily choked, and turpentine is one of the most dangerous drugs to administer, not only from its highly irritating and searching nature (liable to cause death by spasmodic closing of the mouth of the windpipe should it enter), but from the fact that it will hardly mix with any ordinary drench. The administration must be made with great care. To ensure safety, the turpentine (¼ to ½ oz.) should be thoroughly soaked into a little dry meal, and this again mixed with cold gruel, oil, or even water. Should the scour be the result of an overfeed of succulent grass, or be due to a sudden change of green food, the primary purgative and the secondary astringent action of the turpentine is generally what is wanted. Laxity of the bowels, when there is no positive derangement of system, is easily remedied by altering the concentrated food from cakes which contain large quantities of oil, to the seeds of leguminous plants, as beans, peas, lentils, &c., which are deficient in oils, and possess a costive tendency.

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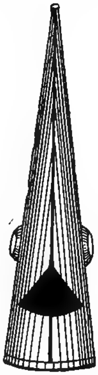
* See the Journal of the Royal Agricultural Society for that year.

"**Husk**" or "**Hoose**" is a bronchial catarrh, the result of the irritating action of a number of long, hair-like, round white worms (*Strongylus filaria*) in the bronchial tubes. It is most common amongst lambs, if they have been pastured on land recently occupied by sheep, as they pick up the eggs (*ova*) with their food. The attack is evinced by a peculiar husky cough, made worse by exertion; by an unthriving appearance; and by a mucous discharge from the nostrils, which often contains the worms or their eggs. Weak animals, and those which develop large numbers of worms, frequently die. To prevent the occurrence of this malady, sheep should be kept in good thriving condition, and young stock should never be put on land previously soiled by sheep. *Remedial treatment* is directed towards the destruction of the worms. A turpentine drench has been long considered efficacious; ⅛ to ¼ oz. at a time being given to a lamb, and this repeated twice, with an interval of three days between two administrations. Turpentine is a most poisonous and dangerous drug if given too frequently, or in too large quantities, to sheep, as it sets up inflammation in nearly all the important organs of the abdomen; and most sheep thus poisoned will die within a few days, after evincing by dulness, restlessness, and the grinding of their teeth, that they are suffering severe internal pain. A purgative only aggravates the condition, and hastens death. Injections of tepid water may be employed to allay pain and relieve the constipated condition which accompanies turpentine poisoning.

A simple **drenching-tin** for sheep, the invention of one Armstrong, was described as follows in the *Sydney Mail*:—

"It is a tin cone, about 8 inches in length, about 1½ inch through at the butt, which is closed. At the mouth or narrow end, which is about ⅜ inch across, and open, the sharp edge is covered by a ring, so that it will not injure the sheep's mouth. Near the base of the cone, and about 1¼ inch from the end, there is an orifice about 1 inch wide. The sheep are held, and the operator having the drench stuff in a bucket, dips the drencher, wide end down, into the mixture. By this action he instantaneously admits into the tin about one ounce of the drench, and raising it he is ready to pour the dose down the throat of the sheep. The cone is, in fact, a measure and drench combined. The large opening freely admits the air, the want of which is the great difficulty met with when a bottle is used. Six or seven men can easily drench three thousand weaners in a day."



Sheep Drenching-tin.

The recent and more approved method of treatment is the injection, directly into the trachea, of ½ to 1 drachm of a turpentine and carbolic acid mixture, fully detailed at page 89.

CHAPTER XXII.—MANAGEMENT OF SHEEP CONTINUED—DISEASES.

Lung Disease—Trembling or Loupin' Ill—Braxy—Temporary Blindness—Foot-rot—Blotches—Dew-rot.

LUNG **Disease.**—Cattle are subject to an infectious lung disease; goats have been found liable to a disease of the same nature at the Cape; and the Author has proved to his satisfaction that sheep also take lung disease one from another, and die, under certain circumstances, in great numbers. It appears to possess very much the nature of a bad cold, and is more severe on old ewes and lambs than on other sheep. Should it break out in a flock during summer, or in fine mild weather in winter, deaths are not numerous; but in a cold and stormy season, which aggravates the disease, one-third to one-half is no unusual proportion of a flock to die.

The symptoms are a violent and painful cough, which seems to give no relief. When seriously affected the animal falls off from the others, and gradually stops feeding. The breathing becomes increasingly heavy and laboured, with heaving at the flank, and moaning in the later stages, evincing the presence of acute bronchitis with severe pain. The ears droop in a peculiar manner, and the head hangs down, while foam appears at the mouth, and a tough yellow mucus at the nose and eyes. None recover after these acute symptoms set in, and death supervenes generally about the third or fourth day. The *post-mortem* reveals a highly congested state of the air-passages, and large portions of the lungs, usually the upper lobes, are found to be solidified, so that they sink on being immersed in water.

The most efficacious treatment is to inject by the intra-tracheal syringe, shown at page 89, two to four drachms of the injection mixture there detailed, and to cover the backs by sewing to the wool with stocking-yarn pieces of strong canvas, 2 feet or 2 feet 3 in. square, which have been water-proofed by brushing one side with boiled linseed oil, to keep rain off and heat in: the sheep should also be liberally fed, and kept perfectly quiet in a well-sheltered place. Any attempt to drug or fumigate the affected animals simply increases the number of deaths. A few usually die of consumption some months after the acute stage of the disease has passed.

It is necessary to state that Principal Williams and various other authorities believe that the origin of the disease above described is entirely parasitic, the special worm being said to be *Strongylus filaria.* The Author freely admits the great injury that thread-worms produce in an irritated condition of the air-passages, and that they might determine, in some cases, whether the affection would be severe enough to destroy life, or mild enough to pass off after a time, without much or any notice, should outside conditions be favourable to recovery; still, at the same time, he has not the slightest doubt of the existence of a contagious lung disease in sheep, which is, however, so varied in its ultimate results by other and external influences—as climate, general treatment, and parasitic action—that it has not been generally recognised or acknowledged. To the public the difference of opinion as to whether the disease is solely parasitic or infectious is of little moment, as the remedial treatment recommended in either case is the same.

There exist weighty reasons for the statement, that much of the death from so-called "rot" in the United

Kingdom in 1879 was largely due to this disease, and not nearly so much to the liver fluke as was supposed, although in many districts the latter was prevalent and most destructive.

> "In Asia Minor a contagious lung disease of goats has long been recognised. Whenever an outbreak occurs among the stock of the villagers, a strict cordon is drawn around the infected area until the destructive malady has ceased to exist. Some importations of Angora goats carried the disease to Cape Colony a few years ago, where it committed great havoc in 1881 and 1882, more especially in the districts of Somerset and Bedford. Several thousands of goats died. The mortality of an entire flock was at least equivalent to 90 per cent. in many places. Prompt measures were taken by the Cape Government to stamp out the disease by the slaughter of all animals on infected farms, and just compensation to the owners of the flocks was awarded. In a little more than twelve months the plague was by this means stayed, and the disease is now unknown in the colony. The Dutch and English farmers called the malady *lung-ziekte*, or 'lung-sick,' by which name contagious pleuro-pneumonia of cattle is known by them. They aver that the symptoms and *post-mortem* appearances were precisely like those of animals of the bovine race that have died of pleuro-pneumonia. The diseases, however, could not be the same. The 'lung-sick' of goats was not communicable to cattle. Even sheep that cohabited with them enjoyed perfect immunity from the disease."—*Agricultural Gazette.*

Trembling or Loupin' Ill is a deadly disease which is only known by a Scotch name, although ailments possessing much of the same symptoms have occurred at times in England. It prevails most on certain grassy up-lands, those growing nard or mat-grass (*Nardus stricta*) being particularly liable to produce it. Zündel, V.S., Strasburg, describes a disease in lambs in which an organism is found very similar to that of Loupin' Ill, and which, he says, "resembles the microscopic plant *Pleospora herbarum.*"

It is spreading in Scotland, not rapidly, but surely. It has been diagnosed by Principal Williams to be caused by the presence of a microscopic organism which may be found in the fluid surrounding the spinal cord of affected sheep. As in the case of the microbe of anthrax, this organism can be cultivated under suitable conditions in chicken- or mutton-broth or jelly. By such cultivation its virulence is gradually attenuated, and it is hoped that inoculation with fluid containing the weakened germs will, in time, prove a preventive of the worst consequences of the disease.

The symptoms are a loss of power in the limbs, and sometimes high fever with affection of the brain. Usually the animal eats, and appears to be perfectly well in health, but is unable to rise. Others, again, drop down instantly and die, especially on being suddenly started. Spring or early summer is the most deadly time. The disease has been long known in many parts of Scotland, but its cause was quite unaccounted for till 1881, when Principal Williams made the discovery while working under the auspices of the Highland and Agricultural Society of Scotland. It had been noticed that in years when ticks (*Ixodes*) were abundant trembling was most prevalent, and on examination the ticks were found to contain organisms identical in appearance to those in the spinal fluid. This is suggestive, but the full chain of facts necessary for the confirmation of the theory has not yet been worked out. The theory advanced by Brotherston, botanist on the Highland Society Loupin' Ill Investigation Committee, holds that Loupin' Ill is caused by ergot, a dark horn-like parasitic fungus which appears on certain common pasture-grasses.

Certain preventive means, which have already proved useful in practice, are advocated by both investigators, viz., cutting or burning, at the proper season, all excess of rough herbage, and the pasturing of cattle along with sheep, especially during early summer.

The fact that spring dipping of sheep is rapidly becoming recognised as the best safeguard against the disease, so far as treatment of the animal is concerned, tends to support the theory advanced by Williams against the ergot-theory.*

The best treatment of affected animals, not actually prostrate, is to keep them in a perfectly quiet place, and to prevent excitement by allowing neither man nor dog to approach within sight of them.

When down, fat sheep should be killed at once; animals in store condition may first be bled, if there be brain affection, then well fed, turned from one side to the other, and moved regularly to fresh ground. A small percentage recover after becoming unable to walk. The practice of looking for the tick and puncturing its posterior to make it lose hold might probably be practised with advantage. At Cape Colony, where a similar disease exists, when the tick is found and removed, a paralysed lamb may recover the use of its limbs within a couple of hours.

Braxy is a blood disease, often described as *Anthrax*, although it is quite distinct, as inoculation with its virus does not cause death in the same way. It prevails much on certain lands in Scotland, usually in autumn but sometimes in spring, when there are sudden and severe white frosts at night, and the grass is of a rank growth. The succulent green herbage or "tath" from the droppings of cattle is most liable to produce the disease, which runs its course so quickly within a few hours that no ordinary remedy is of much avail. The blood becomes viscid and dark, and stagnates in certain parts before death; so that effective bleeding, which is usually attempted, is often impossible. To try bleeding, and to make the animal move about, are almost the sole means at command, and that only in the early stages. The flesh of sheep which have died of braxy is dark-red, particularly in the region of the abdomen, and it has a high and peculiar smell and flavour. Ham made from the hindquarters of a braxy sheep is considered to be rather a delicacy by those who have learnt to appreciate it in youth. Principal Williams considers it to be "nothing more than an acute form of indigestion, with inflammation of the bowels, and flatulence, arising from eating food in a more or less 'fusted' or decomposing condition." It may be prevented, or its prevalence greatly lessened, by not pasturing cattle along with sheep on land subject to it, or at least doing so only in the early part of the season; and by keeping sheep during times of danger from all quickly grown grass, or by only allowing them into such pasture in the middle of the day, when there is no frost on the ground.

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* *Vide* the Author's "Rural Economy and Agriculture of Australia and New Zealand," Sampson, Low, & Co., for a description of tick poisoning in Australia.

Temporary Blindness is most frequently met with after a long spell of wet cold weather. A dim opaque scum forms over the pupil of the eye. This would disappear of itself in time, but as the animal cannot see to feed, it falls off in condition, and may tumble into a hole. Bleeding at the eyes is the remedy usually practised, which brings about the desired effect within a few days. A pen-knife is inserted between the frontal bone and the skin immediately below the inner corner of the eye, and a large vein, which bleeds profusely, is thus severed.

Foot-Rot.—It was noticed that dipping with arsenic greatly improved sheep suffering from foot-rot, and from this sprang the custom, for prevention as well as for cure in mild cases, of driving sheep once a fortnight through a trough containing a solution of arsenic. The drying and hardening action on the horn is injurious if repeated oftener. In very bad cases, all horn that has separated from the inner part of the foot by suppuration must be carefully removed with a sharp knife, and the raw exposed surfaces, which would grow proud-flesh if not attended to, dressed with a caustic or acid mixture, as arsenic is hurtful to a large open sore. A flock of sheep may be seriously injured in condition, and made to appear as if they were foundered, if driven through a strong solution of arsenic when their feet are in a raw state, and serious consequences result if pellets of undissolved arsenic are left adhering to the hoofs.

The arsenic trough should be 12 feet long, 1 foot deep, 8 inches wide at the bottom, and 14 inches at the top, but the ends only 3 inches high. The sheep then easily step into it when it is placed level on the surface of the ground, between two rows of hurdles or paling merely wide enough for them to pass through. The solution (strength, one pound of arsenic, dissolved by boiling with a little carbonate of soda in five gallons of water) is put into the trough, till it is from 1 to 1½ inch deep, so that it cannot rise above the horny part of the foot, else it might blister the skin and cause the hair to fall off. The sheep, having first had all long or loose horn cut away, are driven quietly through, to prevent any splashing of the liquid against the uncovered skin. Crude carbolic acid—strength, 3 or 4 parts to 100 of water—or pitch-oil, dissolved by boiling with black soap, and mixed with eight or ten times its volume of water, is sometimes used instead. The box should have a tight-fitting lid made to close when not in use, in order to prevent the poisoning of stray animals by drinking from it.

To help to maintain the feet in a normal condition, lime in the powdery caustic state is sometimes laid down at gateways or places where the sheep often walk over. A common cause of foot-rot is dung or some foreign matter getting at the tender structures of the internal foot on account of some softening, decay, or weakness of the outer horny box, and then suppuration and fungoid growth follow.

True foot-rot is not generally considered to be contagious, although an attempt is made by Professor Brown, in the *R.A.S.E. Journal* for 1892, to prove its contagious character.

The Author is inclined to believe that there is sometimes a derangement in the systems of sheep, which shows itself by symptoms almost identical with those of foot-rot, and which may one day be found to be contagious, or at all events induced, without any external cause, in a whole flock by unsuitable or possibly excessive feeding.

The feet of sheep that have been affected with foot-rot are more susceptible of the disease in future; thus foot-rot is difficult to get rid of when once well established.

Blotches,[*] causing lameness, originate in wart-like growths, which, in the first stages, are hard and scaly externally, and gorged with blood within. They appear in some seasons about the coronet and lower parts of the legs. The affection is not contagious, although it breaks out in a flock suddenly, and at times attacks the greater number of them more or less seriously. Clover is thought to produce it by mechanically irritating the skin of the legs frequently when sheep are on pasture in autumn, and it usually disappears when the flock is put on roots. Sheep fall off much in condition, and in some of the more aggravated cases die of blood-poisoning, pus having found its way into the blood by absorption of the fœtid discharge which comes from the sores in the later stages of their development. *The remedies are* to remove the sheep from the conditions under which the malady broke out, and to dress the affected parts without delay with the hot iron, or with carbolic, caustic, or acid applications.

Dew-rot is a cause of lameness, which appears in April, and even to a greater extent in autumn, in damp foggy weather, or when there are sudden changes of temperature at night resulting in frosts or heavy dews. It appears at first in the form of white blisters, between the digits, or on the anterior surface of the coronet. The hair falls off the affected parts, which are left bare, and in a short time become open sores. If they are not at once treated by using a stimulating embrocation, after opening them with a knife, the inflammation and irritation spread until the whole foot-structure is involved, and the ultimate condition becomes something like an aggravated form of foot-rot, the whole of the horny parts sloughing off. When it takes this serious form, the proper treatment is to poultice with tar, bran, or linseed cake (ground and "burst" with hot water) to reduce inflammation, allay pain, and keep dirt from the wounds.

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[*] Termed "oafe" or "orf" in Scotland.

Sheep thus affected fall very much off in condition, but there is no fear of death if proper precautions be taken. This disease is reported to have appeared in Gloucestershire, for the first time, about 1870.

Some places are more subject to it than others. The pastures are frequently worst which have not a good aspect, such as those lying away from the sun. Immediate and constant attention is positively necessary to prevent the development of the mature form of the disease; and the whole flock must be removed, and put on arable land which is not under pasture. Dew-rot very frequently appears among ewes that are going with the ram, and are consequently better fed at this time than usual. A rapidly-improving condition may render the system more susceptible to the disease, as is the case with many other diseases. Sheep that are being forced, in the cases of high farming or for show purposes, are more liable to give the shepherd trouble than those that are fed in a moderate way; and the death-rate, as a rule, is much higher.

Another common cause of an excessive death-rate is allowing sheep, through bad management or want of proper food, to fall into an unthriving condition, or, in common language to get a "backset."

If hoggets are kept, more particularly late into spring, on a turnip crop which has not been properly cleaned of weeds while growing, a very alarming death-rate frequently occurs. There is a pretty wide-spread belief in Gloucestershire, both amongst farmers and shepherds, that chick-weed (*Stellaria media*), if abundant, is most hurtful to young sheep.

CHAPTER XXIII.—SHEEP DOGS.

The Collie Dog—Appearance and Characteristics—Points quoted from Rules of Northern and Midland Sheep-dog Club—Type of the Old English Sheep Dog from the same Rules—Sheep Dog Trials.

THE **Collie Dog.**—The common belief that the collie is treacherous, is a calumny upon probably the most valuable and sagacious, mild-tempered and patient, servant of the sheep-farmer. It is quite true that a collie which has been brought up in the wilds may be shy and refuse to be patted or even touched by a stranger, but this is merely the result of training and surroundings upon a highly-strung nervous disposition. Dogs that are well treated are usually extremely sensitive, and seem to be as much discomfited by a moral rebuke—an unkind look, word, or action of his master—as most animals would be by physical chastisement. This indicates an amount of sympathy and good fellowship between the dog and his master, which is quite unattainable in the relationship which exists between man and such a noble and serviceable animal even as the horse.

The mental powers of a collie dog also develop under kind treatment, associated with firm and consistent management and control, such as is necessary in training a dog to work so that he will obey his master's call, and understand and act in obedience to his master's sign or gesture. When near at hand the word and look of the master form the chief means of guidance, but at a distance the whistle and motion can alone be relied upon. The period of life at which a dog is most susceptible of learning is when it is between six and twelve months old. A dog which is descended from working parents is usually more easily trained than one which is sprung from a fancy show-yard strain which has not been accustomed to work. It is a question not yet determined how much this may be due to want of training in successive generations, or to the persistent inbreeding which is carried on among the best show-dogs. Though inbreeding is useful in preserving a show-yard type, it undoubtedly tends to spoil the temper and disposition for training and for work. Good showyard quality is, nevertheless, not incompatible with first-rate working performances. There is no reason why attention should not be paid to both important characteristics, or why they should not be combined in one and the same animal; but to be successful in this effort, it would probably be necessary to insist upon greater posterior cranial development in the show dog than is at present the fashion.

In describing the **external form or figure of the collie dog,** it may be said, generally, that the points nearly correspond to those of a hunting horse. The shoulders should be oblique; the withers narrow or sharp; the hindquarters long; the chest deep to give abundance of lung-room, but not wide, else the animal cannot gallop; the back broad, well-coupled, and muscular; the ribs well sprung; and the belly not too much tucked up like that of a greyhound.

The shape and pose of the ears and the tail are regarded with special importance. Prick-ears, giving the head a foxy appearance, are as objectionable as hanging or lop-ears. The ears should stand up while the dog is on the alert, and the tips should incline slightly forward, forming hollows to catch the sound similar to the hand of an aged person put up while listening, in the familiar manner which calls for no description. The tail should not be too short, or set on too low on the hindquarters. It should not be carried gaily, but should droop—not, however, lower than the houghs—the point turning slightly up, without the animal being cock-tailed or swirl-tailed; and in the case of the rough collie, it should be covered by a good flag all the way to the tip. A close under-coat of fur extending over the body is of great importance in a working collie, as although the straight hard outer hair, which acts as an outer covering of thatch, may get wet in stormy weather, the under fur keeps the skin warm and dry even when the dog is exposed for hours on the hill-side. Black-and-tan dogs, especially of the darker shades, are frequently defective in the under-coat, owing to there being a stain in the blood from the so-called Gordon setters of comparatively recent times. The coat of the rough collie should not part along the back line while dry, and if parted while wet the second coat should still obscure the skin.

The hair on the forelegs is smooth and short in front, but it lengthens into a long silky fringe or feather down the back of the leg all the way to the pastern. The hind-legs are free from fringes, and they ought to be set on straight—not cow-houghed, "five-o'clock" or V-shaped—else the stifle joints project and the power of motion is weakened. To be "hare-footed" or long-footed is objectionable. Dogs ought to stand on their toes or be "cat-footed." The collie-claw, or dew-claws, on the hind feet (parts strongly developed in the St Bernard, being in that breed frequently double), should be cut off with a pair of scissors at an early age in the case of dogs which are intended to work. If not removed they are liable to be torn when snow covers the ground and becomes slightly crusted on the top, as is the case when frost occurs after a mock-thaw; the toes of the dog sink, and the claws come in contact with the ragged edges of the broken snow-crust.

The dew-claw seems to be the remains of a natural and no doubt useful appendage, which existed in the common ancestors of some of our most distinct breeds of dogs, as the claws in question have been known to appear in puppies which were first crosses between a clawless spaniel and clawless English terrier, the ancestors of both breeds having been clawless for many generations.

The following descriptive points have been extracted from the Rules of the Northern and Midland Sheep-dog Club.*

Type of Rough Collie.

Head.—Should be in proportion to dog's size. Skull moderately wide between the ears, and flat, tapering to the end of the muzzle, which ought to be of a fair length, but not too snipey, with only a slight stop.†

Teeth—Strong and white. The top jaw fitting nicely over the lower; and where much over or at all under-shot, it should count against the dog.

Eyes.—Of almond shape, set obliquely in the head, and the shade consistent with the colour of the dog. A full or staring eye is very objectionable.

Ears.—Small, and when the dog's attention is attracted, carried semi-erect; but when in repose it is natural for them to be laid back on the ruff.

Neck.—Long and well arched, and shoulders muscular and sloping.

Back.—Rather long, strong, and straight, the loin slightly arched, and the chest fairly deep, but not too wide.

Forelegs.—Straight and muscular, with a fair amount of bone. The hindlegs should be rather wide apart, with stifle well bent, forming sicklehocks.

Feet.—Compact, knuckles well sprung, claws strong and close together, pads cannot be too hard.

Coat.—Should consist of a long straight outer coat, as hard as possible, with a dense growth of under-coat. The hair on thighs and tail should be as abundant as possible, but short and smooth on head and ears and below the houghs. A long frill and handsome mane, finishing with cape on the shoulders, is very characteristic of the breed.

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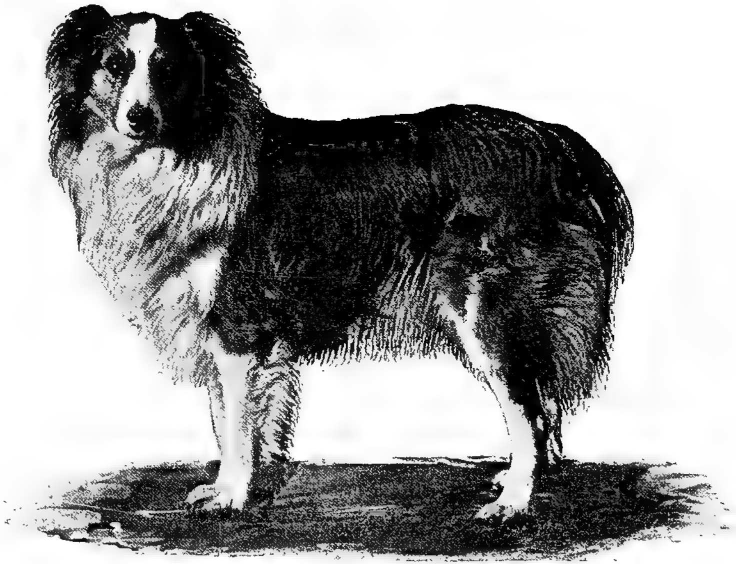
* Secretary—Harold Macbeth, Sale, Cheshire.

† *See* footnote, p. 303.



COLLIE DOG, "STEEPLE JACK," 18,193.
Son of Champion "Sly Fox." Won many Prizes.
The Property of R. BARRETT, London.

Symmetry.—The dog should be of fair length on the leg, and his movements active and graceful.

Height.—Dogs, 22 to 24 inches ; Bitches, 20 to 22 inches.

Tail.—Of medium length ; and when the dog is standing quietly should be slightly raised, but more so when excited.

Type of Smooth Collie.—The smooth collie should be the same in every particular as the rough collie, excepting the coat, which should be short, hard, and dense.

Type of Natural Bobtail Rough Collie.—The natural bobtail rough collie is the same in every particular as the rough collie, with the exception of a natural bobtail.

Type of Natural Bobtail Smooth Collie.—The natural bobtail smooth collie is the same in every particular as the smooth collie, with the exception of a natural bobtail.

Note.—In all cases of bobtails, a docked tail will disqualify,

Scale of Points.

Head	25
Ears	15
Body	10
Legs and Feet	15
Coat	25
Tail	10

Type of the Old English Sheep Dog.

Skull.—Capacious, and rather squarely formed, giving plenty of room for brain power. The parts over the eyes should be well arched, and the whole well covered with hair, as defined in "coat."

Jaw.—Should be fairly long and square. The "stop"* should be defined, but not to a great extent.

Eyes.—These, of course, vary in different colours of dogs. In the dark-blue shades they should be dark-brown. In the lighter colours they will be found to follow them, and become paler in shade, while where white predominates a "wall" or marble eye may be considered typical.

Nose.—Always black in colour ; fairly large and capacious.

Teeth.—Strong and firm, and should be evenly placed in the jaw.

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* "The indentation between the skull and the nasal bone near the eyes."—*Vero Shaw's definition.*

Working dogs often have their incisors broken off. This is in no way detrimental.

Ears.—Medium sized, and carried close to the head, coated with hair of a moderate length.

Legs.—The forelegs should be straight and possess plenty of bone. They should remove the body a medium height off the ground without approaching legginess. They should be well coated all round.

Feet.—Moderately large, round, toes well arched, and pads capacious and hard.

Tail.—This is a most important point in the Old English Sheep Dog. Without a doubt many dogs are bred without the slightest approach to a caudal appendage; while, on the other hand, some in the litters will be found with half, three-quarters, and whole length tails. The breeding of those without tails should be encouraged and be persevered with, and be given preference to in judging, provided the dogs are good elsewhere. A tail of any length takes away the appearance and the "corkiness" * of the dog. A docked dog can generally be detected by the bluntness at the end of the stump.

Neck and Shoulders.—The neck should be fairly long, arched, and graceful, and well coated with hair. The shoulders should be set on slopingly, and the dog generally be found to stand lower at the shoulders than on his hind quarters.

Body.—Rather short, and very compact. The ribs should be well sprung, and the brisket deep and capacious. The loin should be very stout, and to a certain extent arched, while the hindquarters should be bulky, and the hams densely covered with coat, very often of a softer and more woolly description than is to be found on other parts of the body.

Coat.—Profuse, and of a good texture, *i.e.*, fairly hard and strong. There should also be a double or under coat.

Colour.—Varies; but preference should be given to dark-blue, light, or pigeon-blue and steel-grey dogs. The colours are generally intermixed with white, which imparts to the dog a more attractive appearance.

Height.—Fair stand and measurement at the shoulder, from 20 inches upwards. The bitches, of course, smaller than the dogs Great height is not to be encouraged, for it takes away the corkiness and cobbiness * of the dog.

General Appearance.—He is a strong compact looking dog, profusely coated all over. He has a peculiar springing style of movement, and is a thick-set, muscular, able-bodied dog, with an intelligent expression.

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* Compactness.

Scale of Points: Total, 100.

Head	10	Ears	5
Jaw	5	Legs	10
Eyes	5	Tail (undocked)	10
Nose	5	Neck and Shoulders	10
Colour	10	Body, Loin, Hindquarters	10
Teeth	5	Coat	15

Sheep Dog Trials have for many years occupied a good deal of attention and interest in certain localities of the United Kingdom; and thanks to such men as Edward W. H. Jones,* in Wales, and G. F. Bowden, of Somersal, Derbyshire, the method of competition is becoming more and more systematised. Trials have also become popular in America, where a considerable number of the best British dogs have recently been taken.

"The prescribed work or task," says Jones in his excellent little book, "is generally as follows:—Three sheep being set at liberty on a spot some half-mile distant from the shepherd and the dog, out of the dog's sight, and even sometimes out of the sight of the shepherd also, the dog has (1) to go to find the sheep; (2) bring them over a course more or less beset with natural and artificial difficulties to the shepherd, who is restrained from proceeding over a certain boundary to the assistance of the dog, and, with the shepherd's assistance when within this boundary, to drive the sheep to a small enclosure; and (3) pen them within a certain specified time—generally ten minutes." Out of a total of 60 points, the find = 18; the return = 30; and the penning = 12.

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* Author of "Sheep Dog Trials: their Standard of Adjudication, Origin and Progress; together with the Sheep Dog: its History, Varieties, Points, Breeding, and Training." Printed at the *Brecon and Radnor Express* Office.

APPENDIX A.

TWO TYPICAL EXAMPLES OF THE STOCKING OF FARMS IN SOUTHERN AND MIDLAND ENGLAND.

Data of Use in the Calculations.*

HORSES.—3 are kept per 100 acres arable on light land ; 4 kept per 100 acres arable on heavy land ; cost per annum for feeding each horse, £25 ; with shoeing and sundry bills extra, £30 ; one man and pair of horses cost £100 to £110 a year.†

Grass at 3s. 6d. per week for 22 weeks,=£3. 17s., which would pay the rent of 1½ or 2 acres. One acre at least of good old pasture should be set aside per horse.

Hay, 24 lbs. per day for 7 months=nearly 2¼ tons per horse. Consuming value, taken at half the sale value,=£2 to £2. 10s. per ton ; or use 1 ton of hay and 1½ ton of good oat straw.

Litter, 1½ ton for the winter season. Averaging the yield of oats at 52 bushels per acre, 2 acres are consumed per horse when three bushels are given per week in winter and one bushel in summer. So much of this might be sold, and beans, bran, and other suitable feeding stuffs bought to take its place.

Sheep.—2 ewes with 2¼ lambs (a fair crop), or 2½ lambs (a good crop), are kept per acre on medium pasture in summer.

Roots, ½ ton given per day to 100 ewes on grass till lambing time, and 1 ton per day after lambing, or=1 ton per day for four months, or, 120 tons÷15 (average in tons per acre)=8 acres per 100 ewes.

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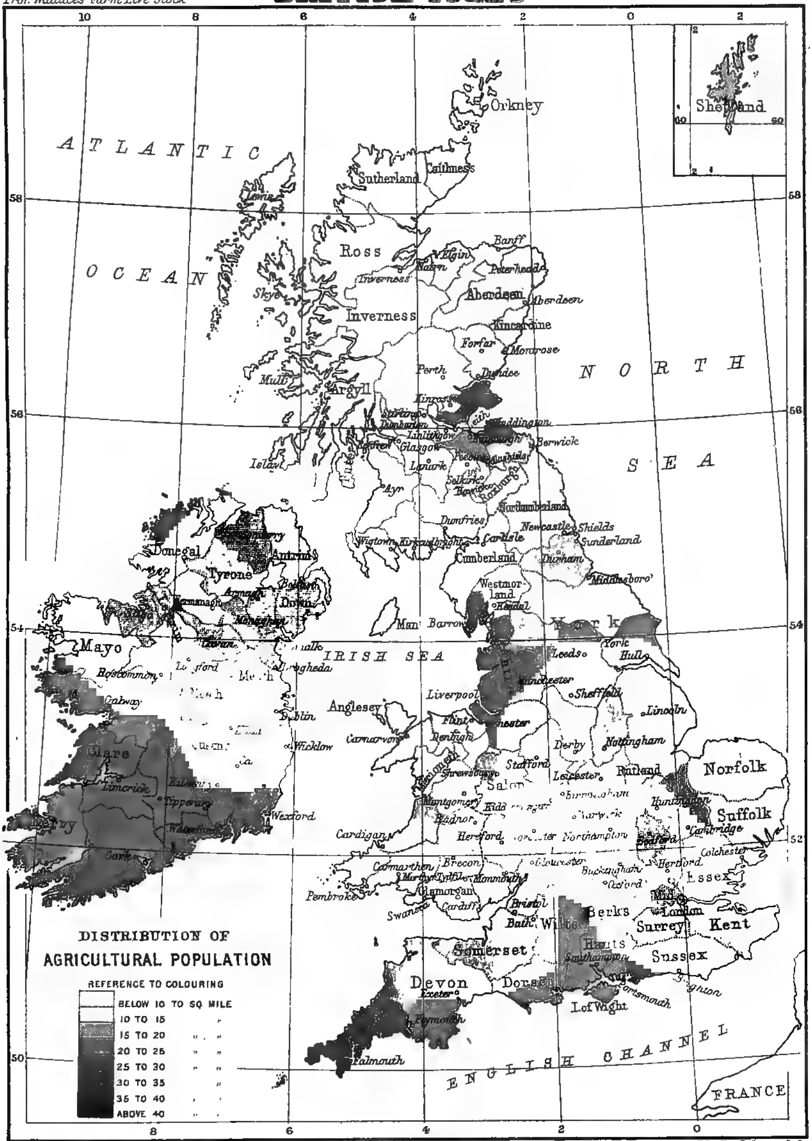
* The prices current in 1885 are still retained, consequently allowance will require to be made in adapting the figures to the present time of a reduction of say 20 to 25 per cent. in some instances.

† The figures are stated for ordinary farm horses which do no exceptional amount of carting on the road. The cost of feeding the large lorry, van, or cart horse in town, where food requires to be purchased at the highest rates, amounts to about 14s. weekly, or £36 per annum, but this sum may vary, probably 2s. per week up or down, with the nature of the work done.

BRITISH ISLES



The Edinburgh Geographical Institute

John Bartholomew & Co.

English Miles
0 20 40 60 80 100

Ewes not on grass, and also clipped sheep or hoggets after Christmas, consume 24 lbs. per day: therefore 200 eat 1 acre (15-ton crop) in one week. Beginning with lambs put on in September, it is approximately right to say 1 acre will keep 300 per week on an average during the first root season = 16 lbs. of roots per day, but they would not be quite enough for the larger breeds.

Hay should also be allowed = 1 ton per acre of roots.

Cake = ¼ lb. to each sheep per day for six months amounts to 70 lbs. more than 2 tons for 100 sheep. It is near enough, practically, to say 2 tons.

Bullocks.—1 acre of good pasture, or 1¼ acre to 1½ acre, according to quality, should, during summer, keep one fattening bullock, which ought to gain 20 stones of beef in 23 weeks. One store animal might be sufficient stock for 1 acre of second-quality land.

Turnips, ¾ cwt. per day, or 7 tons in six months, is nearly ½ acre for each bullock. If giving 1 cwt. per day, 1½ bullock may be kept per acre of turnips (15 tons) between six and seven months. The price at 7s. 6d. per ton = 4½d. per cwt.

Hay, 1 stone (14 lbs.) per day for 26 weeks = 22¾ cwts. A large-sized fattening bullock should eat about 1¼ stone = 17¼ lbs. per day. An ordinary crop of "seeds" hay = 1½ ton per acre; a good crop, 2 tons.

Of natural hay, 1½ ton per acre is a good crop. Heavier crops become white at the bottom, and are not of such good quality, except on some rich moist meadows where the larger grasses greatly predominate.

Of straw, a bullock in a yard will eat and trample down 3 or 4 tons in six months; 1 or 2 tons more could be trampled down if necessary.

Of meal and cake mixture, 6 lbs. per day to each bullock for six months gives a total of ½ ton, less 28 lbs.—say, ½ ton each.

Cows.—One cow can be kept summer and winter on 2½ acres of superior dairy-grass-land; while 3 acres, up to 5 or 6 acres, of ordinary quality are necessary in a mountainous dairy district.

Hay cut from 1 acre of natural meadows = 1½ ton, or 19 lbs. per day per cow for six months; this, plus ½ ton to 1 ton of good straw, is enough fodder for an average dairy cow: 24 lbs. of hay per day = 2¼ tons in seven months: 25 lbs. of hay per day = 2 tons in six months.

Mixed concentrated food, given in spring after calving and before grass comes, may vary in cost from £1 per cow (ordinary feeding) to £2 each (high feeding).

Cotton cake given in summer on the grass, 3 lbs. per day for six months=(nearly) 5 cwts. per cow, and at £6 per ton, costs 30s. per cow.

Root and forage crops for all the year round are already given on pages 122 and 123.

Rent and Taxes amount to, say, from 3s. to 5s. per acre.

Implements.—Total cost per acre, £1 on a farm half arable and half pasture, up to 30s. if it is all arable, or even £2 per acre if many new and expensive implements be bought, or when the holding is small. A 500-acre farm might thus have £500 to £750 or £1000 of capital sunk in implements.

Capital required for an ordinary farm=£5, £8, or £10 per acre: in high farming it may mount up to more.

EXAMPLE NO. 1

Is given as an answer to the first three questions set in the Examination for the Diploma of the Royal Agricultural Society of England in 1884.

Question (1). "What capital is required for a farm of 500 acres—half arable and half pasture?—the arable being turnip and sheep land, the grass, 50 acres good feeding land, the rest suited for young stock."

Question (2). "What proportion of capital would you apply to—

1. Cattle. 2. Sheep. 3. Horses. 4. Implements and machines. 5. Tillages, &c.?"

Question (3). "State the most suitable course of cropping?"

In all arable farm calculations the rotation is the first point to settle.

Question (3).—Rotation for 250 Acres Arable.

A Five-course Shift.

1. Wheat, 50 acres.
2. Oats, 50 acres (better straw for fodder than barley). [Catch crops following more or less; as rye, trifolium, vetches, rape, &c., for sheep food in spring.]

3. Roots, 50 acres, mostly eaten on the land by sheep; part carted to the yard for cattle.
4. Barley, 50 acres (part might be oats instead).
5. "Seeds," 50 acres, all cut once for hay and the after- or lattermath eaten by sheep.

Question (2).—To find the numbers, and affix the prices, of the Horses, Cattle, and Sheep, that the foregoing 250 acres of acres of arable and 250 acres of grass-land will keep.

Cattle.

250	acres,	total of grass.
50	„	(the best) keep 50 fatting bullocks.
200	„	left.
75	„	keep 50 bullocks one year younger.
125	„	left.
16	„	(second quality) to graze 8 horses.
109	„	left.
34	„	cut for hay.
75	„	left for sheep.

Horses.

Being light land, the number of horses required would be 3 per 100 acres cultivated=8 horses. At £30 to £40 each, say=£320.

Sheep.

75 acres of grass left for sheep.
2 sheep per acre with their lambs.

150 ewes @ £4* each=£600 total capital in ewes.

One hundred and fifty ewes get 1½ ton of roots per day on grass for four months or 120 days=180÷tons 15 (average crop in tons per acre)=12 acres turnips required for the ewe flock.

Tegs, 200 eating 16 lbs. turnips per day consume 18 acres in six months or twenty-six weeks.

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* Too high for an ordinary flock at current prices.

Turnips.

12 acres set aside for ewes.
18 „ „ tegs.

30 „ total for sheep.
20 „ for 50 cattle = 70 lbs. (fully) each per day for six months.

50 „ total turnips disposed of.

Fodder.

(1.) *Straw.*

150 acres of grain crops @ 1¼ ton straw per acre.
× 1¼

187 tons straw (50 bullocks eat and trample down 3½ tons each).
175 „ for cattle.

12 „ for horse litter ; to go to the cattle-yard afterwards.
Some of the straw given to the cattle for litter would first be used for thatching, which would not spoil it for its ultimate purpose.

(2.) *Hay.*

50 acres seeds @ 1½ ton of hay per acre.
+ 1½

75 tons total seeds hay.
34 „ cut from the 34 acres of natural meadow—rather a light crop.
109 „ total hay.
18 „ for 8 horses = 2¼ tons each.

91 „ left.
30 „ allowance of 1 ton per acre of turnips for sheep.

61 „ left to be sold, or a little more given to the sheep and a small foddering per day to the bullocks.

Where a good market for hay cannot be got, it might pay better to pasture half of the "seeds" land instead of cutting it.

Capital = Spring Valuation of Stock, &c.

Cattle.		
50 bullocks @ £20 each,	£1000	
50 " @ £13 "	650	£1650
Sheep.		
150 ewes, with lambs @ £4 each,	£600	
200 tegs @ 60/ each—a high price,	600	£1200
Horses.—8 @ £40 each,		320
Implements.—£1 per acre all over,		500
Tillages.		
50 acres wheat @ 50/,	£125	
100 " oats and barley @ £2,	200	
50 " "seeds" @ £1,	50	
50 " turnip land (including catch crops and manures for the same) @ £3,	150	525
Half-year's Rent, Tithe, and Taxes @ 28/ per acre per annum,		350
Cash in hand to pay wages and expenses,		455
Total capital		£5000

Question (1).

Capital required per acre = £10.

At current rates the above prices might be adjusted so that the capital required might be reduced by £3 or £4 per acre.

EXAMPLE NO. 2.

The following calculation will show the rotation which might be adopted on a 300-acre farm in the south of England, consisting of two-thirds arable suitable for sheep, and the rest pasture for grazing or dairy purposes; it gives also the stock kept, and the amount of capital required per acre, apportioning the amount for horses, cattle, sheep, implements, &c. Besides this will be found the number of labourers required, their different duties, and the amount necessary per annum for wages; together with a Michaelmas valuation and a statement of receipts and expenses for a year.

A four-course rotation adopted for the arable land.

50 acres wheat—or part oats to produce better fodder.
50 ,, roots, mostly swedes; average, 15 tons per acre,—5 acres of mangel, 20 to 25 tons per acre, would keep up the above average, and allow 2 or 3 acres to grow potatoes.
50 ,, oats.
50 ,, clover or "seeds" all cut once for hay.

200 acres, the given amount of arable.

Pasture.

100 acres grass.
75 ,, pasture should carry 150 ewes and their lambs (say 200) in summer.

25 ,, left.
10 ,, keep 6 or 7 horses.

15 ,, left for 10 cows' pasture = 1½ acre each.
Or 5 cows might be kept, and their calves reared each year; the heifers coming into milk at two years off, and the bullocks of the same age put up to finish, in the autumn following.

Roots.

50 acres, average 15 tons.
12 ,, for 150 ewes = 1½ ton per day for 4 months during winter while on grass: by giving half quantity for 2 months at first, before lambing, the turnips may be spread over 5 months.

38 ,, left.
1 ,, for 10 cows = 30 lbs. each per day for 4 months in winter, including the time they are dry.

37 ,, left (carried forward)

37 acres (brought forward)
20 „ for 200 tegs: 18 acres are consumed in 6 months by 200 tegs going on as lambs in September = 16 lbs. per day being rather little for large breeds.

17 „ left.
½ „ for 7 horses.

16½ „ left.
5½ „ for 50 tegs, bought in autumn, to feed.

11 „ left for bullocks: 7 tons are consumed by a fattening bullock in 6 months @ ¾ cwt. per day, leaving 1 ton per acre over, after feeding 2 bullocks per acre, which would make up the possible total to 24 bullocks.

Fodder.

(1.) *Straw.*

100 acres grain crops @ 1¼ ton straw per acre: this is a low average, but it is off light land.
× 1¼ ton.

125 tons straw.
20 „ for horses: half for litter, and the remainder for fodder being sufficient with 1 ton of seeds hay for each horse.

105 „ left.
10 „ as part of the cow-fodder: 1 ton per cow.

95 „ left.
10 „ for cow's litter, which could be done without if necessary.

85 „ for 24 bullocks = 3½ tons each, to supply fodder and litter. The litter is supplemented by the rough stable cleanings being thrown into the open yard.

(2.) *Hay.*

50 acres of "seeds" hay.
× 1½ the average number of tons per acre.

75 tons total of hay.

75 tons of hay (brought forward).
40 „ given to the sheep—a little over 1 ton per acre of roots consumed (37 ac.), or something more than 1 lb. per sheep per day.

35 „ left.
10 „ for 10 cows, which with 10 tons of straw allowed provides the necessary 25 lbs. each per day for 6 months.

25 „ left.
7 „ for 7 horses also getting part straw.

18 „ left; and might be sold at market or sale value—£4 per ton, more or less.

If there is no market, which is usually the case when a farm is located away from a large town or railway station, 10 tons given to the sheep would supply ¼ lb. more for each per day, and a foddering might go daily to the bullocks.

Michaelmas Valuation—29th September.

150 ewes @ £3 each,	£450
200 home-bred tegs 50 bought do. } @ 40/ each,	500
7 horses @ £35 each,	245
10 cows @ £20 each,	200
8 pigs @ 30/—fed on refuse, grain, and potatoes,	12
24 bullocks @ £17 each,	408
100 acres grain crops (@ £8 to £10), say @ £9 per acre,	900
50 acres roots @ £5. 10/—nearly 7/6 per ton,	275
75 tons hay @ £2—consuming-value taken at half the sale-value,	150
Implements @ £1. 10/ per acre,	450
	£3590
Petty cash,	10
Total capital required,	£3600

£3600÷300 (the number of acres)=£12 capital per acre.
Now depreciated (1893) at least 35 per cent.

Expenses and Purchases other than of stock bought to fill up the places of those sold that appeared in the first valuation.

Rent, Taxes, and Labour.

Rent, 300 acres, @ 30/,		£450 0 0
Taxes, 4/ per acre,		60 0 0
Labour, 35/ per acre, arable,	£350 0 0	
Labour, 10/ per acre, grass,	50 0 0	
		400 0 0
		£910 0 0

Purchased Cakes and Feeding Stuffs.

For cows (@ £1 each),	£10 0 0	
For 24 bullocks, 12 tons @ £7. 7/,	88 4 0	
For 250 sheep, 5 tons @ £7. 7/,	36 15 0	
		134 19 0

Seed.

Rye-grass, home-grown; clover, 10/ per acre,	£25 0 0	
(Wheat 5/, oats 3/ per bushel), 225 bush. @ 4/=	45 0 0	
		70 0 0

Manure.

Super, 3 cwts. per acre for turnips = 150 cwts. @ 3/6,	£26 5 0	
Nitrate of soda and sulphate of ammonia for grain crops and potatoes, 2 tons @ £10 (average),	20 0 0	
		46 5 0
Shoeing (30/ per horse) *plus sundry bills* for repair of harness, implements, &c. = £5 each.		35 0 0
Coal, &c., for the engine—a fixture belonging to the farm,		16 0 0
Interest on £3600 capital @ 4 p. c. =		144 0 0
Total expenditure for the year (carried to page 316),		£1356 4 0

Receipts from Sales of Farm Produce for a year, leaving the numbers and value of stock as is found in the valuation at last Michaelmas.

From Sheep Stock—

Receipts for wool, and death and depreciation neutralise each other as follows :—

Sale of wool (6 lbs.) at 5/ each on 150 ewes,	£37 10 0
Death, 3 or 4 per 100, and difference in price of old ewes sold and about 50 tegs bought,	37 10 0

200 lambs (produce of 150 ewes) @ £2 each,		£400 0 0
250 tegs sold @ 60/ each, profit £1 each,		250 0 0
On horses there should be no loss if young ones are broken in and others sold at their best.		
From Cattle—		
10 cows (produce 600 gals. milk @ 7d. = £17, 10/ each)=		175 0 0
10 calves @ 50/ each,	£25 0 0	
Less loss through sale and repurchase of 3 cows to prevent depreciation of the stock,	15 0 0	
		10 0 0
24 bullocks @ 35/ per month of increase (for six months)=		252 0 0
8 pigs yield a profit of £2 each, food supplied by the farm=		16 0 0

From Sale of Grain—

(Wheat, 4¼ qrs. per ac. @ 35/=£7 8 9)
(Oats, 7½ qrs. „ @ 20/=£7 10 0)
100 acres grain crops.
14 „ off for horses.

86 „ @ £7. 10/ per acre—after paying market expenses,	645 0 0
From Poultry—	
50 hens and 20 ducks @ a profit of 2/6 each=	8 15 0
Return from produce in the year,	£1756 15 0
Total expenditure for the year (brought from page 315),	1356 4 0
Total profit,	£400 11 0

The loss from death is assumed to be allowed for in stating the prices obtained. Should grain rise, say 10/ per quarter on wheat, the profit on the above farm, due to this item alone, would be increased by £200 a year. But, on the other hand, the fall of each 7/6 per quarter which has taken place since the time to which the calculations refer, has reduced the profit on such a farm by £150. The prices of live-stock cakes, feeding stuffs, and manures are now (1892) considerably reduced, in some cases even 20 to 30 per cent. from the prices quoted above.

The foregoing do not pretend to be more than two of many methods which may be adopted of arranging the stock and crops on such farms.

The following Balance-Sheet and Revenue and Expenditure Account will enable the reader to follow more exactly the figures in the foregoing example (No. 2), and to verify the results. The accounts are framed on the footing of a tenant entering into possession of his farm at Michaelmas of an assumed year, with stock, &c., as on page 314, carrying on one year's transactions, as on pages 311 (six lines) to 316, and striking a balance at the Michaelmas succeeding his entry, with stock, &c., then in number and value exactly the same as at entry. In the Revenue and Expenditure Account, the value of grain, roots, and hay consumed is stated on each side, as well as the other receipts and expenditure described on pp. 311 to 316.

Dr. BALANCE–

	As at Michaelmas 1898.			As at Michaelmas 1899.		
	£	s.	d.	£	s.	d.
To Ewes,	450	0	0	450	0	0
,, Tegs,	500	0	0	500	0	0
,, Horses,	245	0	0	245	0	0
,, Cows,	200	0	0	200	0	0
,, Pigs,	12	0	0	12	0	0
,, Bullocks,	408	0	0	408	0	0
,, Grain Crops,	900	0	0	900	0	0
,, Roots,	275	0	0	275	0	0
,, Hay,	150	0	0	150	0	0
,, Implements,	450	0	0	450	0	0
,, Cash in hand or bank,	10	0	0	410	11	0
	3600	0	0	4000	11	0

Dr. REVENUE AND EXPENDITURE ACCOUNT*

Expenditure.	£	s.	d.
To Ewes, Expenditure on their account,	238	10	0
,, Tegs, ditto,	233	0	0
,, Cows, ditto,	82	0	0
,, Ditto, Loss through Sales to prevent Depreciation,	15	0	0
,, Bullocks, Expenditure on their account,	250	14	0
,, Horses, ditto,	160	15	0
,, Rent, Taxes, and Labour, This after crediting pasture rent, £150, debited above under proper heads,—Ewes, Horses, Cows.	760	0	0
,, Seed,	70	0	0
,, Manure purchased,	46	5	0
,, Shoeing, &c.,	35	0	0
,, Coals, &c.,	16	0	0
,, Interest on Capital,	144	0	0
,, Balance or Profit,	400	11	0
	2451	15	0

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* For the arrangement of the above figures the

SHEET.*

Cr.

	As at Michaelmas 1898.			As at Michaelmas 1899.		
	£	s.	d.	£	s.	d.
By Capital, ...	3600	0	0	3600	0	0
,, Revenue Account for Profit, 1898-99, ...	...	...	...	400	11	0
	3600	0	0	4000	11	0

FOR YEAR, ASSUMED, SAY 1898 TO 1899.

Cr.

Revenue.	£	s.	d.
By Grain Crop, sold or used, ... If understated, so far as used on Farm, *per contra* correspondingly understated, so result not affected. Same applies to Roots and Hay.	900	0	0
,, Roots, used, ...	275	0	0
,, Hay, ditto, ...	150	0	0
,, Ewes, for Lamb Crop, 200 at 40s., . .	400	0	0
,, Tegs, disposed of at profit (subject to Expenditure *per contra*) of, ...	250	0	0
,, Cows, for profit (ditto) Calves, and Milk, ...	200	0	0
,, Bullocks, disposed of, profit (ditto) .	252	0	0
,, Pigs, ditto, ditto, . . .	16	0	0
,, Cash, for Poultry sold, ...	8	15	0
	2451	15	0

Author is indebted to A. T. Niven, C.A., Edinburgh.

The following Labour Note shows the particulars of the £400 stated as expense of labour on page 311.

Labour—

3 carters.
1 cowman.
2 shepherds.
4 labourers.

10 @ 13/ per week, average,	£338	0	0
1 bailiff @ £1 per week,	52	0	0
11 men,	£390	0	0
3 extra hands at harvest for three weeks @ 24/ per week,	10	16	0
Total labour,	£400	16	0

The bailiff, carters, head shepherd, and cowman are all supposed to have cottage and garden accommodation in addition to the above money wages.

In some districts wages are higher, while in others they are lower. The above may be taken as an average which may be raised or lowered to suit the times.

APPENDIX B.

LIVE STOCK SOCIETIES.

Extracted by permission from the Live Stock Journal Almanac.

HORSES.

Jockey Club.—Sec., Edward Weatherby, Old Burlington Street, and Newmarket.

National Hunt Committee.—Secs., Messrs Weatherby, Old Burlington Street, London.

Shire Horse Society. — Offices, 11 Chandos Street, Cavendish Square, London. Sec., J. Sloughgrove. Terms, Annual Members, £1. 1s.; Life Members, £10. 10s.

Suffolk Horse Society.—Sec., Fred. Smith, Woodbridge, Suffolk. Life Members, £5; Annual Members, 10s.

Cleveland Bay Horse Society of Great Britain and Ireland.—Annual subscription, £1; Life Members, £10; Life Governors, £20. Hon. Sec., Wm. Scarth Dixon, 68A Micklegate, York.

Hackney Horse Society.—Sec., Henry F. Euren; Assistant, F. F. Euren, 11 Chandos Street, Cavendish Square, London, W.

Select Clydesdale Horse Society of Scotland.—Sec., Wm. Law, 210 Kennedy Street, Glasgow.

Clydesdale Horse Society of Great Britain and Ireland.—Offices, 46 Gordon Street, Glasgow. Sec., Archibald MacNeilage. Terms, an entrance fee of 10s.; Life Governors, in addition, pay £10; Life Members, £5; and Annual Members, 10s. annually.

Hunters' Improvement Society.—Sec., A. B. Charlton, 11 Chandos Street, Cavendish Square, London, W.

Yorkshire Coach Horse Society.—Hon. Sec., J. White, The Grange, Appleton Roebuck, Bolton Percy, Yorks.

Shetland Pony Stud Book.—Sec., George Bruce, 35 Market Street, Aberdeen.

New Forest Pony Association.—Secs., R. W. Blathwayt, Sandy Down, Lymington, Hants, and A. P. Higham, Brockenhurst, Lymington, Hants.

Trotting Union of Great Britain.—Sec., F. Cathcart, 11 Ludgate Hill, London, E.C.

Pony Stud Book Society.—Sec., G. H. Hardwin, 34 Victoria Street, London, S.W.

CATTLE.

Shorthorn Society of Great Britain and Ireland.— Offices, 12 Hanover Square, London, W. Sec., E. J. Powell. Terms for Life Members, an entrance fee of £1. 1s.; subscription of £10. 10s.: Annual Members, entrance fee of £1. 1s.; subscription, £1. 1s. yearly. Entries in the *Herd Book:* For Members, bulls, 3s. each; cows, with not more than two calves, 1s. 6d. each. For Non-Members, bulls, 10s. each; cows, with not more than two calves, 5s. each.

Hereford Herd Book Society.—Sec., S. W. Urwick. Offices, 20 East Street, Hereford. Terms, entrance fee, 10s. 6d.; Life Members, £5. 5s.; Annual Members, 10s. 6d. per annum. Bulls entered in *Herd Book* for 2s. 6d., and cows 1s. each.

Hereford Cattle Breeders' Association.—Sec., J. O. Urwick, 20 East Street, Hereford.

English Jersey Cattle Society.—Sec., John Thornton; Assistant Secs., T. W. Hammond and L. J. Craufurd, 7 Princes Street, Hanover Square, London, W.

Devon Cattle Breeders' Society.—Sec., John Risdon, jun., Wiveliscombe, Somerset.

South Hams Herd Book.—Editor, A. Michelmore, Totnes, Devon.

Red Polled Society of Great Britain and Ireland.—Sec., H. F. Euren, *Mercury* Office, Norwich.

Sussex Herd Book Society.—Sec., W. C. Young, 191 Fleet Street, London, E.C.

Galloway Cattle Society.—Sec., Rev. John Gillespie, M.A., Mouswald Manse, Ruthwell, Dumfriesshire, N.B.

Polled Cattle Society.—Sec., Alex. Ramsay, 9 Old Market Place, Banff, N.B.

Ayrshire Cattle and Herd Book Society.—Sec., J. M'Murtrie, 70 Newmarket Street, Ayr.

Highland Cattle Society of Scotland.—Sec., Duncan Shaw, W.S., 42 High Street, Inverness.

Jersey Herd Book.—Joshua Le Gros, La Prarie, St Lawrence, Jersey.

North Wales Black Cattle Society.—Sec., Wm. Arthur Dew, Wellfield, Bangor. Subscription: Life Members, £5; annual subscription, 10s.

English Guernsey Cattle Society.—Annual subscription, £1. 1s.; life membership, £10. 10s. Hon. Sec., Julian Stephens, 19A Colman Street, London, E.C.

Kerry Herd Book.—Registrar, Royal Dublin Society, Kildare Street, Dublin.

Kerry and Dexter Cattle Society.—Hon. Sec., F. N. Webb, Babraham, Cambridge, or 191 Fleet Street, London, E.C.

SHEEP.

Shropshire Sheep Breeders' Association and Flock-Book Society.—Secs., Messrs Lythall, Mansell, and Walters, College Hill, Shrewsbury.

Oxford Down Sheep Breeders' Association.—Sec., R. Henry Rew, 26 Norfolk Street, Strand, London, W.C.

Suffolk Sheep Society.—Hon. Sec., E. Prentice, Stowmarket, Suffolk; Editor, C. E. B. Davis, Kirtling, Newmarket. Terms: Life Members, £5. 5s.; Annual, 10s. 6d., with entrance fee, 10s. 6d.

Pure Select Wensleydale Sheep Breeders' Association.—Sec., T. T. Willis, Manor House, Carperby, Bedale.

Hampshire Down Flock-Book Society.—Sec., J. E. Rawlence, Salisbury.

Wensleydale Longwool Sheep Breeders' Association and Flock-Book Society.—Sec., T. J. Other, Howgrave, Ripon.

Lincoln Longwool Sheep Breeders' Association.—Sec., S. Upton, St Benedict's Square, Lincoln.

Cheviot Sheep Society.—Sec., John Robson, Newton, Bellingham, Northumberland.

Cotswold Sheep Society.—Sec., James W. Taylor, Cold Aston, Cheltenham.

Southdown Sheep Breeders' Association.—Sec., W. W. Chapman 27 Baker Street, Portman Square, London, W.

Dorset Horn Sheep Breeders' Association.—Sec., F. V. Ensor, Dorchester.

National Sheep Breeders' Association.—Sec., W. W. Chapman, 27 Baker Street, Portman Square, London, W.

SWINE.

British Berkshire Society.—Hon. Sec., Heber Humfrey, Shippon, Abingdon.

National Pig Breeders' Association.—Sec., W. C. Young, 191 Fleet Street, London, E.C.

GOATS.

British Goat Society.—Sec., H. S. Holmes Pegler, Zoffany House, King's Langley.

APPENDIX C.

Names of the more prominent Breeds of British Live Stock, with the **Dates** of the establishment of the various Breeders' Societies and of the issue of the first volumes of the pedigree records of each, so far as these exist.

CATTLE.

Shorthorns.	First Volume Herd Book,	1822
Hereford.	" "	1846
Sussex.	" "	1874
Devons.	" "	1851
Jerseys.	" Island Herd Book,	1866
Jerseys.	" English "	1879
Guernseys.	" " "	1885
Red Polled.	" " "	1877
Aberdeen Angus.	" " "	1862
Welsh,		1883
Longhorns (Herd Book now discontinued),		1880
Galloways.	First Volume Herd Book,	1862
West Highland.	" "	1885
Ayrshires.	" "	1878
Kerry.	" "	1890

PIGS.

Large White Yorkshire. Middle White Yorkshire. Small White Yorkshire. Small Black. Tamworth.	All registered in Herd Book of National Pig Breeders' Association, established 1885.	
Berkshire.	British Berkshire Society Herd Book,	1885

HORSES.

	Thorough-Bred Horses.	First Volume Published,	1793
Stud Book published about same time.	Hunters' Record.	Established,	1886
	Hackney Horse Society.	Do.,	1884
	Cleveland Bay Horse Society.	Do.,	1886
	Yorkshire Coach Horse Society.	Do.,	1886
	Shetland Pony Society.	Do.,	1890
	Suffolk Horse Society.	Do.,	1877
	Clydesdale Horse Society.	Do.,	1877
	Shire Horse Society.	Do.,	1878
	New Forest Ponies,	No Special Register.	
	Welsh Ponies,		
	Dartmoor Ponies,		
	Exmoor Ponies,		
	Pony Stud Book.	First Volume Published,	1892

SHEEP.

Shropshire.	Flock Book Published,	1883
Suffolk.	Do.,	1887
Southdown.	Do.,	1892
Lincoln.	Do.,	1892
Leicester.	No Flock Book or Society.	
Cotswold.	Flock Book Published,	1892
Oxford Down.	Flock Book Published,	1889
Devon Longwool.	No Flock Book or Society.	
Dorset Horn.	Flock Book Published,	1892
Wensleydale.	Do.,	1890
Kentish or Romney Marsh.	No Flock Book or Society.	
Herdwick.	Do.	
Border Leicester.	No Flock Book or Society.	
Cheviot.	Flock Book Published,	1892
Blackfaced.	No Flock Book or Society.	
Lonk.	Do.	
Ryeland.	Do.	
Dartmoor.	Do.	
Exmoor.	Do.	
Welsh.	Do.	
Roscommon.	Do.	
Hampshire Down.	Flock Book Published,	1890

APPENDIX D.

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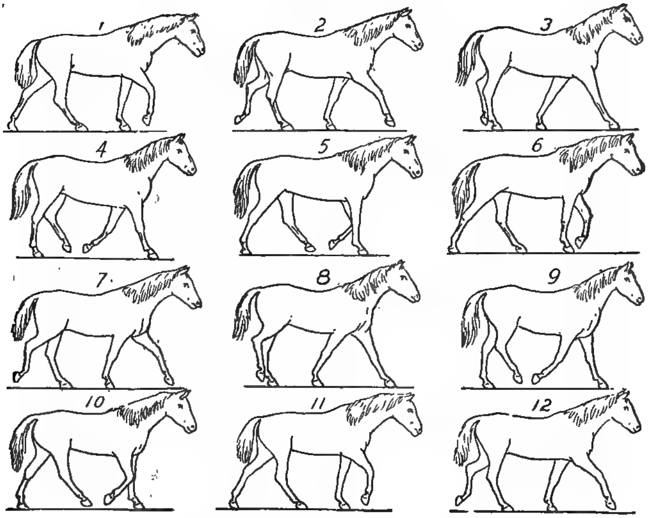
THE REGULAR PROGRESSIVE MOVEMENTS OF THE HORSE.



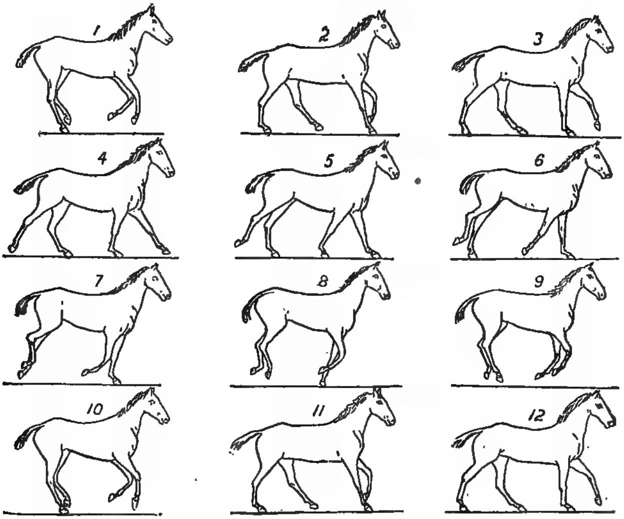
Some Consecutive Phases of the Walk.

The stride is completed at 11, and 12 is the same as 2.

Walk.—A method of progression, common to nearly all the terrestrial vertebrates, which is effected by a regulated succession of limb-movements, as described below.

If, in the quadrupedal walk, the notation begins with the landing of a right hind foot, the consecutive foot-fallings will be the right fore foot, the left hind foot, the left fore foot, followed by its diagonal hind, with which the record began. The time intervals of foot-fallings vary with different species of animals, but their sequence is invariably the same with all—the apes alone excepted, with which the landing of a hind foot is usually preceded by that of its lateral fore foot. During a single stride of a quadruped in an ordinary walk it is supported in eight different ways: twice upon the laterals; twice upon the diagonals; twice upon two hind feet and one fore foot; and twice upon two fore feet and one hind foot.

"It is thus seen that when a horse during a *walk* is on two feet, and the other two feet are suspended between the supporting legs, the suspended feet are laterals. On the other hand, when the suspended feet are severally in advance of and behind the supporting legs, they are diagonals. These invariable rules seem to be neglected or entirely ignored by many of the most eminent animal-painters of modern times."—Eadweard Muybridge, *On the Science of Animal Locomotion*, p. 8 [R. I. GT. BRIT.].



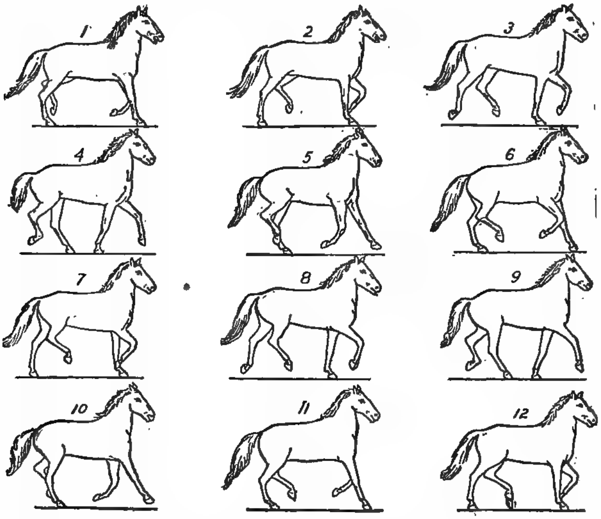
Some Consecutive Phases of the Canter.

The stride is complete at 10, and 11 and 12 are reproductions of 2 and 3.

Canter.—A system of quadrupedal locomotion in which the feet are landed on the ground in the same consecutive order as in the walk, but not with the same comparative intervals of time. *See* Walk.

Assuming that in the canter the notation is begun after a propulsion through the air with a final thrust by the left fore foot, the landing will take place on the right hind foot, followed in order by the right fore, the left hind, and the left fore, from which a succeeding thrust off the ground will be effected. The consecutive supporting feet are :—(1) the right hind foot; (2) the right hind and right fore feet; (3) both hind and the right fore foot; (4) the left hind and right fore feet; (5) the left hind and both fore feet; (6) the left hind and left fore feet; (7) the left fore foot alone, from which the animal leaves the ground.

"The *canter* is usually regarded as a slow gallop, probably from the facility with which a change from one gait to the other can be effected; an important difference will, however, be observed."—E. M.



Some Consecutives Phases of the Amble.

The stride is completed between 10 and 11, and 11 and 12 show more advanced phases of the movement than 1 and 2.

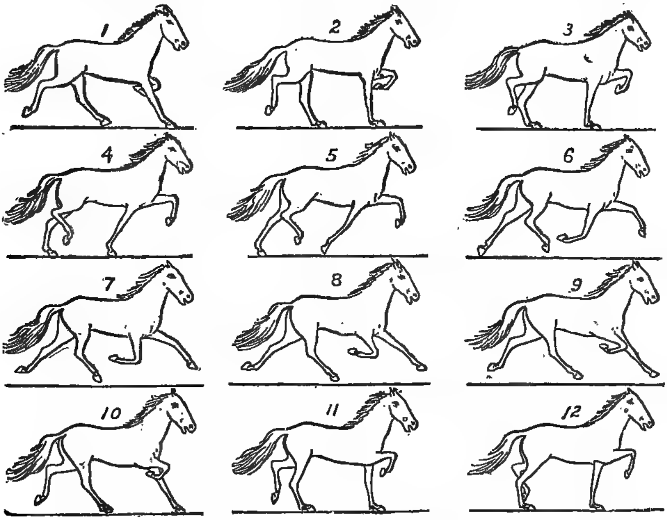
Amble.—A method of progressive motion with the same sequence of foot-fallings as in the walk (*see* WALK), but in which a hind foot or a fore foot is lifted from the ground before its fellow hind foot or fellow fore foot is placed thereon, the support of the body devolving alternately upon one foot and upon two feet, the single foot being alternately a fore foot and a hind foot, and the intermedial supports alternately diagonals and laterals. *See* plate above.

The amble is natural to the elephant, and in some countries to the horse, the mule, and the ass. The sequence of foot-fallings is the right hind, the right fore, the left hind, the left fore, beginning again with the right hind foot. At no time during the stride is the body of the animal unsupported. The amble has been erroneously confused with the rack or pace; it is the most gentle and agreeable to the rider of all methods of locomotion of the horse, whereas the rack is probably the most disagreeable and ungraceful.

> "Out of the old hackney-pace to a fine easy *amble.*"
> Ben Jonson, *Every Man in his Humour*, Act iii. sc. 2.

> "The gray mare . . . breaking from her sober *amble* into a gentle trot."—Dickens *Barnaby Rudge*, pt. i. ch. 14, p. 167 [H. & H. '71].

> "The *amble* and the walk are the only regular progressive movements of the horse wherein the body is never without the support of one or more legs; in all others the weight is entirely off the ground for a longer or shorter period."—E. M.



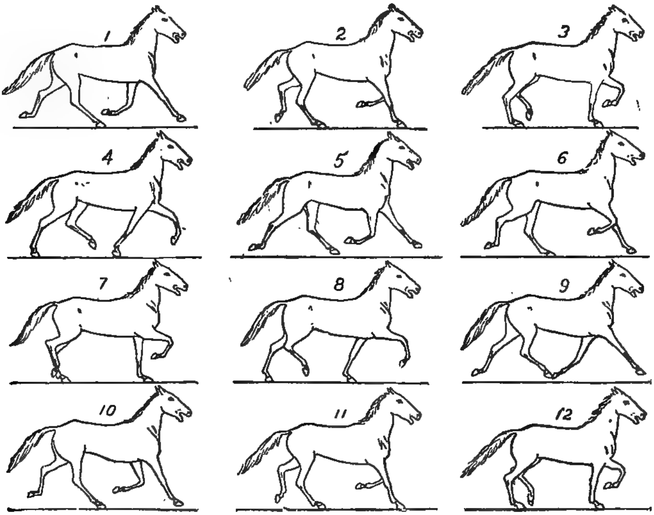
Some Consecutive Phases of the Trot.

The full stride is not completed until the right fore foot in 12 is brought to the ground as in position 1.

Trot.—A more or less rapid progressive movement of a quadruped in which the diagonal limbs act nearly simultaneously, and during which the body is entirely without support for varying intervals of time and distance.

When a horse is trotting at a high rate of speed, the fore foot usually precedes its diagonal hind foot in being lifted from and placed upon the ground, and the body will be entirely without support for about one-half of the total length of the stride. Beginning the notation with the landing of the right fore foot, the order of the supporting feet will be :—(1) the right fore foot ; (2) the left hind and right fore feet ; the left hind foot ; (4) without support ; (5) the left fore foot ; (6) the right hind and left fore feet ; (7) the right hind foot ; (8) without support. The time during which one foot alone is on the ground is very brief.

"It appears somewhat remarkable that until quite recently many experienced horsemen were of opinion that during the action of the *trot* one foot of a horse was always in contact with the ground."—E. M.



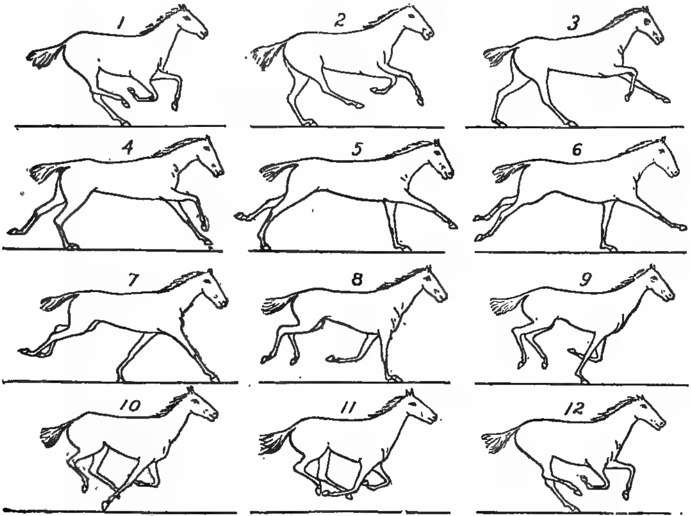
Some Consecutive Phases of the Rack or Pace.

The stride is completed at 10, and 11 and 12 are reproductions of 2 and 3.

Rack—A method of progressive motion by a quadruped in which two lateral feet are, with nearly synchronous movement, placed upon and lifted from the ground, alternating with the other laterals, the body of the animal being in the intervals entirely without support. Sometimes called the PACE.

With some animals the rack is a hereditary movement; with others it is acquired. A trained horse can make faster progress by racking than by trotting.

"The *rack* differs from the trot in the nearly synchronous action of the laterals instead of the diagonals."—E. M.



Some Consecutive Phases of the Gallop.

The stride is completed at 12.

Gallop. — The most rapid method of progressive quadrupedal motion (sometimes erroneously called the *run*), in which the animal springs into the air from a fore foot and lands upon the diagonal hind foot.

If the notation of a stride by the horse during a gallop begins with the landing of a hind foot upon the ground, as, for example, the left hind foot, the right hind will next strike the ground and at a considerable distance forward; then follow in succession the left fore foot and the right fore foot, at a distance from each other sometimes equal to the height of the animal. The consecutive foundations of support (beginning the notation as above) are:—(1) the left hind foot; (2) both hind feet; (3) the right hind foot; (4) the right hind and the left fore feet; (5) the left fore foot; (6) both fore feet; (7) the right fore foot, from which the animal will spring into the air, in which phase (the only one of the gallop when the animal is entirely off the ground) all of the legs are flexed under the body. The first foot to strike the ground will be the hind foot diagonal to that from which the spring was effected. *See* plate on last page.

"This movement [the *gallop*] has in all ages been employed by artists to convey the impression of great speed, although, curiously enough, the phase in which the horse has been almost invariably depicted is one which is impracticable during uniform progressive motion, and conveys no such impression to the careful observer."—E. M.

We call special attention to the following extracts from the definitions of **step** and **stride**, as applied to the progressive movements of man and the lower animals.

Step.—In animal locomotion, an act of progressive motion in which one of a pair of the supporting members of the body is thrust in the direction of the movement, involving the transfer of the support from the one member to the other.

"In the bipedal walk or run a step is one-half of a stride or full round movement. With all quadrupeds, except the kangaroo and other jumpers, four steps are necessary to complete a stride. In the walk these steps take place at approximately regular periods of time. In the trot the diagonals, and in the rack the laterals, make a step almost simultaneously. In the amble, the canter, and the gallop, these steps occur at irregular intervals of time."

Stride.—In animal locomotion, an act of progressive motion, completed when all the feet are returned to the same relative positions they occupied at the beginning of the notation of the movement.

"The normal stride of a biped consists of two uniformly executed steps. The normal stride of a quadruped consists of four steps. These steps may occur at separate and approximately regular periods of time, as in the walk; at separate and irregular periods of time, as in the amble, the canter, and the gallop; or in pairs, as they are effected during the trot with the diagonal, and during the rack with the lateral, members.

INDEX.

ABERDEEN-ANGUS breed of cattle, 58, 63.
— bull, points of, 63.
Aberdeenshire shorthorns, 39.
Aboriginal cattle and sheep, characters of, 12, 15.
Abortion in cows, 143.
— in cows, means of prevention of, 145.
— in cows, series of exhaustive experiments on, necessary, 147.
Acorn-poisoning, 98.
"After-birth," the, in calving, 142, 144.
"After-pains," effect of, in cows, 147.
Agar's Dart (horse), 203.
Ages of horses, how determined, 220.
Agricultural labourers, inefficient education of, 2.
Aiton on Ayrshire cattle, 70.
"Alloy" strain, the, of shorthorn breed, 30.
Albion, Prince of (a Clydesdale horse), 185.
Alderney cattle, 70, 74, 79.
Alexander, Prince (bay Clydesdale horse), 181.
Allerton (famous American trotter), 207.
Amble, the, 328.
America, demand for Jersey cattle in, 76.
— employment of asses and mules in, 209.
— loss of cattle caused by "horning" or "hooking" in, 102.
— national horse of, 204.
— popularity of "dishorning" in, 104.
— wild horses of, 176.
American pork, how to distinguish, 157.
— trotting register, 204.
"Amnion," the, in calving, 142.
Animal, fat, rule for finding the dead-weight of, approximately, by measurement, 113.
— points of a good feeding, 93.
Animals, characteristics of fat, 14.
— constitutional weakness of, 7.
— influence of domestication on, 13, 16.
— knowledge of habits of, important, 1.
— prices of, at Edinburgh sales, 112.
— variable features of male and female, 6.
Anglesey black bullocks and grazing cattle, 53.
— black cattle, 53.
— black cattle, milking qualities of, 53.
Anguses, black polled, M'Combie on breeding of, 8.
— black polled, as compared with the Galloway, 64.
— black polled, Ralston's experiments at Glamis, 8.
Anthromyiæ, 277.
Apoplexy, parturient, in cows, 148.
Appendix A, stocking of farms, 306–320.
— B, Live Stock Societies, 321–323.
— C, various Breeders' Societies of British Live Stock, with the dates of establishment of the various herd-books, stud-books, flock-books, &c., 324–325.
— D, the regular progressive movements of the horse, 326–332.

Asia Minor, contagious lung disease of goats in, 292.
Asinus, how distinguished from Equus, 208.
Ass, the domesticated, 208.
— the size of, influenced by treatment and climate, 209.
— the wild, of Abyssinia, 209.
— the wild, of Central Asia, 209.
— popularity of, in some countries, 209.
Atavism, 12.
— peculiar cases of, 55, 62.
Avondale, Prince of (noted horse not in stud-book), 183.
Axtell (famous American trotter), 207.
Aylesbury Dairy Company, 44.
Ayrshire Cattle and Herd Book Society, 322.
— breed of cattle, 69.
— bullocks, excellence of, 73.
— cow, essentially a cheese dairy cow, 73.
— milking qualities of, 73.
— points of, 72.
— breeding from, 10.

BACON, curing of, 156.
— model sides of, 157.
Bakewell's method of breeding, 32, 41, 159, 232.
Bar None (noted Shire horse), 183.
Barbell (horse), 203.
Barley as food for horses, 223.
Barley Harvest (horse), 202.
Barrenness, how occasioned, 13.
— obviated by change of climate, 34.
Barter's, Richard, records of yield of milk from dairy cows, 125.
"Bates" branch of shorthorns, 36.
— branch of shorthorns, colours of, 37.
— branch of shorthorns, noted breeders of, 39.
Bathurst's, Earl, Hereford oxen, 45.
"Beastings," or colostrum, 83.
Bellfounder (horse), 207.
Belted colouring of Scotch polls, 60.
Berkshire breed of pigs, 163.
Bevas Pullen's King William (horse), 203.
Billings, Dr Frank S., on "cornstalk" disease, 97.
Bistoury for dilating teats, 133.
Blackfaced Highland crosses, 250.
— Highland sheep, 249.
— well-bred sheep, dressing of, for exhibition, 249.
Black Hawks, the, 207.
— Polls, the, 58.
Blaze (black horse), 181, 206.
Blickling Hall herd, 57.
Blindness in sheep, 295.
Blood-poisoning in calves, 84.
— in cows, 145.
— in sheep, 297.
Bloomfield Champion (noted Clydesdale horse), 182.
Blotches in sheep, 297.
Booth and Bates blood, commingling of, 38.
— cattle compared, 37.
— cattle, interbreeding of, 38.
"Booth" branch of shorthorns, 36.
— branch of shorthorns, noted breeders of, 38.
Border Leicester, the, 232.
— where largely used for crossing, 232, 234.
Bos indicus, 18.
— longifrons, 15, 70, 75.
— longifrons, the milk cow of the Druids, 75.
— primigenius, 15, 42.
— scoticus, 17.
— taurus, 26.
— urus, 15.
Bot fly. *See* Warble fly.
Boxes for feeding cattle, 101.

Braxy in sheep, 294.
Breaking of horses, 212, 217.
Breeders' Societies, dates of establishment of, 324.
Breeding, Bakewell's method of, 32, 41, 159, 232.
— cattle, food for, 13.
— Collings' system of, 32.
— Darwin on principles of, 3.
— effects of in-and-in, 10, 14, 17, 32, 33, 42, 44, 59, 62, 67, 196.
— effects of imagination in, 7.
— effects of line-breeding, 11, 196.
— for first time, 140.
— Lord Panmure's attempt and its result, 61.
— peculiarities transmitted by, 7.
— sow, the, management of, 164.
British cattle, classification of, 26.
— Goat Society, 323.
— live stock, prominent breeds of, 324.
Broncho-pneumonia, 96.
— how distinguished from pleuro-pneumonia, 96, 97.
Buchan cattle, 60.
"Buisting," or marking of sheep, 267.
Bull, a mongrel, objectionable, 6.
— points of Aberdeen-Angus, 63.
— shorthorn, effects of crossing with, 11.
"Bulldogs" for securing cows, &c., 88, 132.
Bulls, features of wild, of Great Britain, 17.
— ferocity of Jersey, 77.
— system of training, 88.
Butter, extension of trade in, with Australian colonies, 124.
— qualities of Guernsey, 79.
— steady supply of, necessary throughout the year, 125.
Buttercups in pasture, 120.
Butter-making, inability of British farmer to compete with foreigners, 124.
— result of the action of County Councils, 125.
— without a churn, 127.
Byerly Turk (horse), 195.
Byre, arrangement of, 100.

CABOT'S map, drawings in, representing objects discovered, 176.
Cadzow Park cattle, 20.
Cæsar, Bos urus of, 16.
— reference to war-horse, 192, 201.
Calves, housing of, in winter, 89.
— hoven in, 87.
— method of rearing, 84.
Calving, for first time, 140.
— operation of, 142.
Canter, the, some consecutive phases of, 327.
Capital required for a farm, 308.
Carbolic oil, in parturition, 142.
Carruchan, Prince of (a Clydesdale horse), 186.
Castle Martin breed of cattle, 52.
Castration of calves, 88.
— of horses, 216.
— of male lambs, 264.
— of male pigs, 168.
Cattle, Aberdeen-Angus breed of, 58, 63.
— aboriginal, features of, 12.
— aboriginal, of Great Britain, 15.
— Anglesey black, 53.
— Ayrshire breed of, 69.
— Blickling Hall herd of, 57.
— breeding and management of, 83.
— British breeds of milking, 69.
— Buchan, 60.
— Castle Martin breed of, 52.
— Channel Islands, 70, 74.

Cattle, comparison between Booth and Bates, 37.
— Devon breed of, 46.
— Dewsland breed of, 52.
— dishorning of, 102.
— distribution of, in India, 49.
— effect of imported blood on, 49.
— effects of in-and-in-breeding on, 10, 14, 17, 32, 33, 42, 44, 59, 62, 67.
— feeding, regularity in, 105.
— Fife horned, 61.
— fly affecting, 98, 117.
— forest, home of, 16.
— forest, characteristics of, 16.
— Galloway breed of, 65.
— Glamorgan breed of, 54.
— Gloucester breed of, 54.
— grazing, 91.
— grooming of, 108.
— herd books, date of establishment of the various, 324.
— Hereford breed of, 43.
— house-feeding of, 100.
— Kerry, 79.
— Kerry, Dexter variety of, 81.
— lice affecting, 90.
— longhorn breed of, 41.
— Low on preservation of ancient, 48.
— M'Combie, Wm., a breeder of, 62.
— Norfolk and Suffolk breed of, 57.
— on hire, effect of letting out, 33.
— Orkney and Shetland, 55.
— polled breeds of, 56.
— polled breeds of, appreciation of, on American prairies, 104.
— prominent breeds of, 324.
— red polled breed, 57.
— reversion to the ancient white breed, 54.
— shelter for, 94, 101, 104, 116.
— shorthorn breed, 29.
— Somerford Park white, 56.
— Sussex breed of, 47.
Cattle, Societies for improvement of, information on, 322.
— Teeswater, 30, 70.
— unnatural symptoms in healthy, 95.
— Watson, Hugh, a breeder of, 62.
— Welsh, 52.
— West Highland breed of, 50, 66.
— wild, 15.
— wild park, their origin, 16.
— Woodbastwick herd of, 57.
— young, liable to ringworm, 89.
Chaplin's, Right Hon. Henry, energetic action, result of, 96.
Chapman horse, 201.
Chartley wild cattle, 15, 23, 56.
"Cherry" tribe, the, 39.
Cheviot cross with Welsh mountain sheep, 255.
— sheep, 247.
— Sheep Society, 323.
Chick-weed hurtful to sheep, 298.
Childers (horse), 206.
Chillingham wild cattle, 15, 16, 18, 22, 70.
Choking in cows, 152.
Cholera in pigs, 174.
Clays, the, 207.
Clean, the, in calving, 142.
Cleansing, the, in calving, 143.
Cleanly habits, differences of individual pigs in the matter of, 167.
Clement's, Andrew, visit to Australia and New Zealand, 124.
Cleveland Bay horse, 201.
— Bay horse, Loyd on, 201.
— Bay Horse Society of Great Britain and Ireland, 321.
— Bay Stud book, points noted in, 202.
Climate of Guernsey, 78.
Clipping or shearing of sheep, 265.
— of horses, 227.
Clun Forest sheep, 245.
Clydesdale horse, the, 180.
— horse, characteristics features of, 185.

Clydesdale horse, compared with the Shire, 191.
— horse, dissatisfaction with regulations for excluding unsound animals at shows, 185.
— horse, foreign demand for, 186.
— horse, the history of, 180.
— horse, importation of English blood, 180, 182.
— horse, points of a, 186.
— horse, prices and pedigrees of, 181–186.
— scapula and humerus of, 189.
— Horse Society of Great Britain and Ireland, 321.
— horses, white feet in, 188.
Coaching horse, the, 202.
— horse, the origin and characteristics of, 202.
— horse, the, connection of with the "thoroughbred," 203.
— horse, the, performances of the breed, 203.
Cochrane's, H. M., of Quebec, famous "Duchess" cow, 38.
Cold, effect of, on milk, 116.
— effect of, on the pig, 165.
— endurance of, by the horse, 178.
— weather, effect of, on quality of pork, 158.
Collings system of breeding, 32, 36.
Collie dog, the, 299.
— dog, the, external form and figure of, 300.
— dog, the, mental powers of, 299.
— dog, the, nature and disposition of, 299.
— dog, natural bobtail rough, 303.
— dog, natural bobtail smooth, 303.
— dog, rough, type of, 302.
— dog, smooth, type of, 303.
— dog, points, scale of, 303.
Colostrum or "beastings," 83.
Colour, of cattle, effects of imagination on, 7.
Colour, transmission of, 9, 18, 30, 37, 44, 51, 60, 68.
Colouring, natural, of the skins of cattle, 32.
Commission, Royal, on horse-breeding, 196.
Concentrated food for cattle, 106.
Conception of mares, difficulties about, 214.
Concrete as flooring for cattle houses, 84.
Conqueror (horse). *See* Tintock.
Co-operative Creamery system, success of, in S. and W. of Ireland, 125.
"Cornstalk disease," 97.
Costiveness, prevention of, in horses, 223.
Cotswold sheep, 235.
— sheep, antiquity of the breed, 235.
— Sheep Society, 323.
— supposed origin of name of hills, 235.
Cow, Ayrshire, points of, 72.
— breeches, 147.
— cost of feeding per day, 126.
— how to put dry, 136.
— pasture, 118.
— points by which to judge, 135.
Cows, abortion in, 143.
— abortion in, means of preventing, 145.
— choking in, 152.
— de-sexed or "spayed," 136.
— docility of Jersey, 77.
— effect of insufficient exercise on, 153.
— exertion (moderate), good for, 116.
— grooming of, importance of, 128.
— food for, 115, 119, 126, 129, 137, 140, 307.
— habit of standing in water, objections to, 119.
— heavy milking, liable to barrenness, 14.
— house feeding of, 126.
— hoven in, 138.

Cows, impaction of the rumen in, 152.
— importance of water supply for, 118.
— imflammation of the udder in, 150.
— inversion of uterus in, 147.
— lameness in, 153.
— loupin'-ill in, 150.
— milk-fever in, 148.
— pasturing of, 115, 129.
— period of lactation in, 134.
— plan by which 100 cows can be fed on 300 acres, 122.
— premature labour in, causes of, 144.
— protracted labour in, causes of, 143.
— protrusion of vagina in, 148.
— rumen, impaction of the, 152.
— signs of pregnancy in, 141.
— signs of approaching parturition in, 141.
— "soiling" of, 115, 121.
— treatment of dairy, 128.
— udder, inflammation of, 150.
— weed in, 150.
Creamery, Co-operative, success of system in S. and W. of Ireland, 125.
Crops on arable land, 123.
— rotation of, 308, 311.
Cross, effect of the first, 12.
— Galloway, excellence of, 68.
— Galloway, by a West Highland bull, 66.
— Hamilton-Chillingham, 22.
— Hereford, excellence of, 68.
— Kerry, excellence of, 81.
— Vaynol-Chartley, 24.
Crossing cattle, effects of, 10, 13, 70.
— experiments in crossing wild cattle with pure-bred Shorthorns, 19.
— pigs, effects of, 160, 162.
Culley, George, on Shorthorn breed, 35.

DAIRY cows, treatment of, 128.
Dairying, 115.
Dairy cows, action of County Councils with regard to, 125.
— Barter's records, 125.
— districts noted for, 115.
— expert of Victorian Government on butter export trade, 124.
— extent of land requisite for, 121.
— need for co-operation for manufacturing and marketing purposes, 125.
— winter, 124.
— winter, necessity for, and difficulties in the way of, 124, 125.
Dandie Dinmont, transmission of features of, 6.
Damsel (Clydesdale mare), 182.
Darley Arabian (horse), 203, 206.
Darnley (a Clydesdale horse), 184.
Dart (horse), 202.
Darwin on heredity and variation, 4.
— on in-and-in-breeding, 10.
— on influence of domestication, 35.
— on principles of breeding, 3.
Darwin's theory of pangenesis, 4.
"Dead bull," Landseer's famous picture of, 16.
Dermatodictes ovis, 277.
Devon Cattle Breeders' Society, 322.
— long-wool sheep, 234.
— North, breed of cattle, 46.
— North, breed of cattle, Somerset type of, 47.
— South, breed of cattle, 47.
Dew-claw, the, of dogs, 301.
Dew-rot in sheep, 297.
Dewsland breed of cattle, 52.
Dexter variety of Kerry cattle, 81.
Dexter stud book, regulations against white markings in the, 80.
Diarrhœa in calves, 87.
— in pigs, 173, 174.
— in sheep, 287.
Dip, sheep, constituents of, 282.
Dipper, a, 281.

Dipping of sheep, 277, 281.
Dipping of sheep, a safe-guard against "loupin'-ill," 293.
Diseases in horses, 179, 197, 223.
Dishorning of cattle, 102.
— of cattle, illegality of, in England, 104.
— of cattle, legality of, in Scotland and Ireland, 104.
— of cattle, popularity of, in America, 104.
— of cattle, short duration of pain of operation, 102.
— of cattle, temperature of animal after the operation, 102.
Distomum hepaticum, 286.
Docking horses, the practice of, 216.
"Doddies," or Angus cattle, 60.
Dog, the collie, 299.
— the collie, appearance and characteristics, 299.
— the collie, points of various types, 302.
— Old English sheep, 303.
— Old English sheep, scale of points of, 305.
— sheep, trials of, 305.
Domestication, influence of, on animals, 13, 16, 19, 25, 35.
Dorset and Somerset Horn sheep, 246.
— and Somerset Horn sheep, peculiarity of the breed, 246.
— Horn Sheep Breeders' Association, 323.
Down-cross sheep, 246.
Dreadnought (horse), 203.
Drench, administration of, to a pig, 173.
— for a horse, 225.
— for a sheep, 289.
Drenching-tin, 289.
Drew, Lawrence, of Merryton, 184, 190.
Drewitt & Sons' history of a Merino flock, 239.
Druids, the milk cow of the, 75.
Dry food to horses, practice of giving, before water, 226.
"Duchess" tribe of shorthorns, 37, 38.
Dumb-martin, 14.
Dunsley's Dart, 203.
"Durham ox," the, 33.

ECLIPSE (horse), 195.
Edinburgh sales, prices of animals at, 112.
Education, importance of, 2.
— necessity of manual and mental, 3.
"Eild," or yeld, 71, 139.
Eild sheep, how known, 259.
Engineer (horse), 206.
English Guernsey Cattle Society, 323.
English Jersey Cattle Society, 322.
Eocenes in N. America, remains of horse in, 175.
Equus caballus, 177.
Equus distinguished from asinus, 176.
Equus Przevalskii, or true wild horse, 177.
Ergotised grass, effect of eating, 144, 293.
"Escutcheon, or "milk-mirror" theory, 134.
Essex pig, the, 163.
Everard, Sir (a Clydesdale horse), 186.
Ewes, breeches for, 262.
— cast, 257.
— feeding of, 258, 268.
Exercise, effect of insufficient, on cows, 153.
Exertion, effect of moderate, on cows, 116.
Exmoor sheep, 256.
Exostoses, how transmitted, 7.
Experiments of Sir J. B. Lawes and Dr Gilbert in sheep feeding, 273.

FAMILY resemblances, causes of, 4.
Farm horses, 178.
— horses, cost of feeding, 222.
— horses, grooming of, 226.
— horses, management of, 221.
Farms, examples of stocking of, 306.
Farrall on Ayrshire cattle, 70.
Farrowing, preparations of sow for, 166.
Fasciola hepatica, 286.
Fat animals, characteristics of, 13.
"Favourite," a shorthorn bull, 35.
Feeding of bullocks, 307.
— of cart horses, 216.
— of cattle, cost of, per week, 109.
— of cattle, regularity in, 105.
— of ewes, 258, 263.
— of farm horses, 222, 306.
— of horses in summer season, 227.
— of lambs, 268.
— 100 cows, plan for, 122.
— of pigs, 168.
— of sheep, 270, 272, 306.
Female animals, influence of, in crossing, 11.
— animals, variable features of, 6.
Fife horned cattle, 61.
Field, *The*, on Vaynol Park wild cattle, 23.
Flashwood (a Clydesdale horse), 185.
Flesh of pigs, 158, 171.
Floor for cattle houses, 84.
Flower, W. H., on the "Horse," 177.
Fly affecting cattle, 98, 117.
— affecting sheep, 278.
"Flyers, Trinity of," 207.
Flying Childers (horse), 206.
— Dutchman (horse), 203.
Foal, food of, 215.
— treatment of, 213, 215.
— weaning of, 215.
Foals, twin, 14.
"Fœtal membrane," the, in calving, 142.
"Foljambe" (famous shorthorn bull), 29.
Food, concentrated, for cattle, 106, 137.
— for cows, 115, 119, 121, 129, 137, 140, 307.
— for horses, 222, 306.
— materials, gradation of changes in, 105.
Foods, composition of, 14.
— effects of a few common, 138.
Foot-and-mouth disease in calves, 84.
— disease in pigs, 173.
Foot-rot in sheep, 295.
— mixture, application of, 153, 295.
Force of inheritance, the, 5.
Foreign demand for Clydesdale horses, 186.
Founder or laminitis in horses, 188, 228.
Fowlers, the, as cattle exporters, 74.
Free-martin, 14.
Fullarton, Colonel, on Ayrshire cattle, 70.
Fuller's earth, a dressing for horses' wounds, 219.

GALLOP, some consecutive phases of the, 331.
Galloway breed of cattle, 65.
— Cattle Society, 322.
— cow, breeding from a, 9.
— cross by a West Highland bull, 66.
— crosses, excellence of, 68.
— Herd Book, 68.
Galton's, Francis, theory of the continuity of germ-plasm, 5.
Galvayne, Sydney, on "Horse Dentition," 220.
Gestation, period of, in cow, 141.
— period of, in ewes, 261.
— period of, in mare, 212.
— period of, in sow, 165.
"Gid" or "sturdy" in sheep, 285.
Gilbert, Dr, on sheep feeding, 273.
Gilbey on the horse, 192.
Glamis, Ralston's experiments at, 8.

Glamorgan breed of cattle, 54.
Glancer (Clydesdale horse), 181.
Gloucester breed of cattle, 54.
Goats, contagious lung disease of, 292.
Godolphin (Arabian horse), 195, 206.
Grass, ergotised, effect of eating, 144, 293.
— ticks, 278.
Grasses, mixture of permanent, as food, 140.
Grazings, qualities of, 93.
"Green milk," use of, 83, 149.
Grooming of cattle, 108, 128.
— of horses, 226.
Guénon's "milk-mirror" theory, 134.
Guernsey butter, qualities of, 79.
— cattle, 78.
— climate of, 78.
"Gwar Goch," 255.

HABITS of animals, knowledge of, important, 1.
Hackney or Norfolk trotter, 199.
— Horse Society, 321.
Hæmatopinus eurysternus, or ox-louse, 91
Hambeltonian (horse), 207.
Hambeltonians, the, 207.
Hamilton-Chillingham cross, 22.
Hamilton, wild cattle at, 20.
— wild cattle, characteristics of, 20.
Hampshire Down sheep, 242.
— Down Flock Book Society, 323.
Harpham Twak (full blood horse), 203.
Hay meadow, amount of produce of, 119.
Heat, effect of, on milk, 116.
— endurance of, by the horse, 178.
Herbage, natural, suitable for cows, 119.
Herdwick sheep, 251.
— unique customs in management of, 252.
Heredity, 4.
Hereford Cattle Breeders' Association, 322.
— breed of cattle, 43.
— breed of cattle, as milkers, 45.
— breed of cattle, as work oxen, 45.
— breed of cattle, characteristics of, 43.
— breed of cattle, Hewer's improvement of, 45.
— breed of cattle, Tomkins' improvement of, 44.
— breed of cattle, early breeders of, 45.
— crosses, excellence of, 68.
— Herd Book Society, 322.
Herod (horse), 195.
Hewer's improved Hereford cattle, 45.
Heilprin, Professor Angelo, on wild horses of America, 177.
Highland Cattle Society of Scotland, 322.
Hinny, a, 210.
Hire, effect of letting cattle out on, 33.
"Hitchin Conqueror" (Shire stallion), 229.
Hob horse, the, 202.
Hobbies, utilisation of, 2.
Hog cholera, 174.
"Horning" or "hooking," effects of, 102, 118, 144.
Horns, absence of, in Scotch polls, 60, 65.
Horse, age of, how determined, 220.
— American trotter, 204.
— Breeders' Societies, names of, 325.
— breeding and breaking of the, 212, 217.
— breeding, Royal Commission on, 196.
— castration of, 216.
— Cleveland Bay, 201.
— clipping of, 227.
— Clydesdale, the, 180.
— cost of, on a farm, 222.
— "dentition," 220.
— diseases of, 179, 197, 223.

Horse, distinction of the true, 176.
— docking of the, 216.
— dressing for wounds of, 219.
— early history of, 175.
— early improvement of, 195.
— effect of crossing on, 11, 196.
— endurance of the, 178.
— exotoses on legs of, 7.
— feeding of young cart, 216.
— feeding in summer season, 227.
— fodder for a, 224.
— food for a, 222, 306.
— forty points of a, 179.
— founder or laminitis in, 188, 228.
— fossilised remains of, 175.
— Gilbey on, 191, 192.
— great, the, 191.
— grooming of, 226.
— in-and-in-breeding of, 196.
— inflammation in a, 226.
— litter for, 227.
— management of farm, 221.
— medicines for a, 225.
— mouthing of, 217.
— mud-fever in a, 226.
— Norfolk hackney, 199.
— Old English black, 192.
— possibility of improving the, 229.
— regular progressive movements of the, 326.
— Shire, the, 190.
— societies for improvement of, information on, 321.
— strong, the, 192.
— studbooks, date of establishment of the various, 325.
— Suffolk Punch, the, 193.
— teething of, 219.
— thoroughbred, the, 194.
— war, the, 191, 201.
— water for a, 225.
— wild American, 176.
— wild, the genuine, 177.
— Yorkshire trotters, 200.
Horses, prominent breeds of, 325.
House lamb, 246.
Hoven in calves, 87.
— in cows, 138.
— in lambs, 269.
Howard, James, M.P., on Clydesdale horses, 187.
"Hubback" (shorthorn bull), 29, 31.
"Humlies," or Brechin cattle, 60.
Hummel or cattle shed, 101.
Hunters' Improvement Society, 321.
"Husk" or "hoose" in sheep, 288.
— or "hoose" in calves, 89.
Hypoderma bovis affecting cattle, 98.

IMAGINATION, effects of, in breeding, 7.
Implements, cost of, 308.
Inheritance, force of, 5.
Injuries, results of accidental, 7.
In-and-in-breeding of cattle, 10, 14, 17, 32, 33, 42, 44, 59, 62, 67.
— of horses, 11, 196.
India, distribution of cattle in, 49.
— stud-horses for, 200.
Inflammation in a horse, 226.
Inoculation as a preventive of pleuro-pneumonia, 96.
Intra-tracheal injection, 89.
Inversion of the uterus in cows, 147.
— of the uterus in ewes, 261.
Irish milking cow, 80, 81.
Ixodes ricinus, 277.
— reduvius, 277.

JALAP (horse), 203.
Jersey bulls, ferocity of, 77.
— cattle, 76.
— cattle, demand for, in America, 76.
— cattle, points of, 77.
— cows, docility of, 77.
— cows, milk of, 77, 78.

Jersey Herd Book, 76, 322.
— the, 74.
— the, Thornton on, 74, 75.
Jockey Club, 321.

KADES, 277.
Kent or Romney Marsh sheep, 236.
— or Romney Marsh sheep, held in favour in New Zealand, 236.
Kerry breed as fancy cattle, 81.
— breed of cattle, 79.
— cattle, Dexter variety of, 81.
— cattle, points of, 80.
— cow, excellence of, 80.
— Herd Book, 80, 323.
— crosses, 81.
"Killerby" shorthorns, 36, 38.
Knowledge of animals, how acquired, 1.

LABOUR in cows, causes of protracted, 143.
— in cows, causes of premature, 144.
Lactation in cows, period of, 134.
Lambing pen, 259.
Lambs, castration of, 264.
— early treatment of, 262.
— feeding of, 262, 268.
— hoven in, 269.
— milk-sickness in, 250.
— weaning of, 268.
Lameness in cows, 153.
— in horses, 228.
Lamplough's Victory (horse), 203.
Lawes, Sir J. B., on cattle feeding, 107, 109.
— computing tables by, 111.
— on sheep feeding, 273.
Lawrence, John, on wild horses, 177.
Laws regulating family resemblance, 4.
Leicester Border sheep, 232.
— improved English sheep, 232.
Leuckart, Professor, on liver-rot, 286.
Lice on cattle, 90.
— on cattle, paraffin oil a remedy for, 90.
— sheep, 278.
Limestone breed, the, of sheep, 252.
— breed of sheep, points and characteristics of, 253.
Limnæa truncatula, 287.
Lincoln, improved, sheep, 234.
— Longwool Sheep Breeders' Association, 323.
Lincolnshire breed of pigs, 162.
Lind's, William, remarkable cow, 127.
Line-breeding, 11.
Litter for horses, 227.
Live-stock computer, 114.
— great function of, 114.
— Societies, list of, 321.
Live-weight of pigs, 170.
— of sheep, 273.
— selling by, 111.
Liver-rot in sheep, 286.
Lochlyoch's black horse (Flemish stallion), 181.
Longhorn breed of cattle, 41.
Lonk sheep, 252.
Loupin'-ill, or trembling, in cows, 150.
— or trembling, in sheep, 292.
Low on Dexter variety of Kerry cattle, 81.
— on habitat of longhorns, 41.
— on polled Suffolk breed of cattle, 58.
— on preservation of ancient cattle, 48.
Loyd's description of the Cleveland horse, 201.
Lung disease in sheep, 290.
Lung-sick, the, or lung-ziekte, in goats, 292.

M'CALL, Principal, on horse disease, 223.
M'Combie, Wm., on cattle breeding, 8, 62.

M'Combie, Wm., on cattle feeding, 108.
— on slow feeding animals, 93.
M'Donald and Sinclair on Hewer's improved Hereford, 43.
M'Dougal's dip for warble fly, 99.
Macgregor (a Clydesdale horse), 185.
Maggot flies, 279.
Male animals, variable features of, 6.
— effect of potency of, 6, 11.
— influence of the first, 6.
Mambrino (horse), 206.
— Chiefs, 207.
Mare, time of conception by the, 213.
— treatment of farm, 212.
Mares, rarity of twins from, 14.
— number of, served by a stallion, 214.
"Mario," a champion shorthorn bull, 39.
"Mashams," 233.
Matchem (horse), 195, 206.
Maturity, propriety of forcing, 92.
Measles in pigs, 174.
Measurement of a fat animal, with rule by which to find the dead-weight, 113.
Medicine for horses, 225.
Meire's live-stock computer, 114.
Melophagus ovinus, 277.
Merino sheep, 237.
— sheep, breeders of, in this country, 238.
— sheep, characteristic points of, 237.
— sheep, distinct types of, 237.
— distribution of, 237.
— sheep, Thomas Drewitt & Son's history of a flock of, 239.
— wool, quality of, when grown in this country, 239.
Metis-Merino, 240.
Messenger (horse), 206, 207.
Milk, amount of, produced, 117, 121.
— average yield of, per day, 127.
— effect of cold on, 116.
— effect of food on, 119, 137.
— effect of heat on, 116.
Milk, favourable secretion of, 116.
— ("green"), use of, 83, 149.
— fever, 121, 148.
— mirror theory, 134.
— secretion of, how reduced, 117.
Milking breeds of British cattle, 69.
— cow, old Irish, 80.
— machines, 133.
— mode of procedure in, 129, 131.
— times for, 129.
— cows, heavy, liable to barrenness, 14.
— qualities of Aberdeen-Angus cattle, 64.
— qualities of Anglesey cattle, 53.
— qualities of Ayrshire cow, 73.
— qualities of Devon cattle, 47.
— qualities of Galloway cattle, 67.
— qualities of Guernsey cattle, 78, 79.
— qualities of Hereford cattle, 45.
— qualities of Jersey cattle, 77, 78.
— qualities of Orkney and Shetland cattle, 55.
— qualities of red-polls, 58.
— qualities of shorthorns, 30, 31.
— qualities of Somerford Park White Herd, 56.
— qualities of Welsh cattle, 53.
— qualities of West Highland cattle, 51.
Milk-sickness in lambs, 250.
"Milling" of "cast" Cheviot ewes, 248.
Mites, scab, 280.
Molinia, or flying-bent, 90.
Montgomeryshire breed of cattle, 44.
Montrave Rosea (Clydesdale mare), 185.
Morgans, the, or Black Hawks, 207.
Mountain breeds of sheep, 247.
Mouthing of the horse, 217.
Moss Rose (Clydesdale mare), 185.
Mud-fever in a horse, 226.
Mule, the, 209.
— the, advantages of, for tramway work, 210.

Mule, the, extensive employment of, in America, 210.
— the, good qualities of, in the performance of farm work, 210.
— the, offspring of, 211.
— the, value of, as a beast of burden, 210.
Musca cadaverina, 277.
— Cæsar, 277.
— canaria, 277.
— vomitoria, 277.
Muybridge, Eadweard, on animal locomotion, 326.

NANCY Hanks (American trotter), 207.
Nardus stricta, 292.
National Hunt Committee, 321.
— Pig Breeders' Association, 323.
Natural herbage the best for dairy produce, 119.
New Forest Pony Association, 321.
Niven, A. T., on stocking of farms, 319.
Nocard, Professor, on prevention of abortion, 146.
Norfolk and Suffolk breed of cattle, 57.
Norfolk trotter, 199, 204.
North Wales black cattle, 53.
— Wales Black Cattle Society, 322.

"OAFE," or "orf," 297.
Oats for horses, 224.
Old Brickhouse (mare), 182.
— Sandbeck (horse), 203.
Orde, Sir John, on Vaynol Park wild cattle, 24.
Orkney and Shetland cattle, 55.
Orloff trotter, 204.
Ortelius on Ayrshire cattle, 70.
Ovis, the genus, 230.
Ox, points of an, 28.
"Oxford" tribe of shorthorns, 37.
— Down sheep, 245.
— Down Sheep Breeders' Association, 323.

PACING action, the, 205.
Pangenesis, the theory of, 4.
Panmure, Lord, and cattle breeding, 61.
Paraffin oil a remedy for lice, 90.
Parasites, external sheep, 277.
— internal sheep, 285.
Parent, influence of a, 4.
Parturition in sheep, 261.
— signs of approaching, in cows, 141.
Pasturing of cattle along with sheep, 93, 293, 295.
— of cows, 118, 140.
Pedigrees of Clydesdale horses, 184.
Peirson's Plato (horse), 203.
Pen, lambing, 259.
Pig Breeders' Association, National, 323.
Pigs, administration of drench to, 173.
— breeds of, 154.
— castration of, 168.
— dark breeds of, 163.
— defects met in Berkshire, 163.
— diseases of, 173.
— effects of crossing, 160, 170.
— fattening, 167.
— feeding of, 168.
— the flesh of, quality of, 158, 171.
— improved breeds of, points applicable to, 155.
— in America, mode of feeding, 169.
— live-weight of, 170.
— management of, 164.
— results of in-and-in-breeding of, 10.
— Sanders Spencer on, 156, 161.
— shelter-shed for, 168.
— Societies for improvement of, information on, 323.
— susceptibility to cold of, 165.
— weights of, in greatest demand, 158.
— white breeds of, 158.
Pleospora herbarum, 292.
Pleuro-pneumonia, 96.
— how distinguished from broncho-pneumonia, 96, 97.

Polled Cattle Society, 322.
Polo-ponies, demand for, in India, 200.
Pony Stud-Book Society, 325.
Pork, cost of producing a stone of, 171.
— quality of, 158, 171.
Potency of the male, effect of, 6, 11.
Pouring, sheep, 283.
Pregnancy in a cow, signs of, 141.
"Pressing," effect of, in cows, 147.
Price Owen on Welsh mountain sheep, 254.
Prices of Clydesdale horses, 184.
Progressive movements of the horse, the regular, 326.

QUARTLYS, the, as improvers of the Devon breed of cattle, 46.
Quayle, Thomas, on unimproved Jerseys, 75.
Queen's premiums, 196.
— plates, 198.

RACK or pace, the, 205, 330.
Ralston's interesting experiment with Polled Angus cattle, 8.
Ramage on wild cattle of Great Britain, 17.
Rectum, protrusion of, in pigs, 174.
Red Polls, the, 57.
Red Polled Society of Great Britain and Ireland, 322.
Register, American trotting, 204.
Resemblance, causes of family, 4.
"Reversion," 12.
"Ride" time, 257.
"Rigged" colouring of Scotch polls, 60.
Rinderpest, effects of, 21.
Ringworm, liability of cattle to, 89.
Ringworms, organisms producing, adhering to gates and rubbing-posts, 90.
Robertson, James, an improver of Kerry cattle, 82.
Roscommon sheep, 236.
Rotation of crops, 308, 311.
Rule for finding the dead-weight of a fat animal by measurement, 113.
Rumen, impaction of the cow's, 152.
Rütimeyer's "Domestic Cattle of the Ancients," 17.
Ryeland sheep, 246.
Rysdyk's Hambeltonian (horse), 207.

SANDBECK (horse), 203.
Sawden's Active (horse), 203.
Scab mites, 280.
Scapula of Clydesdale horse, 189.
Scotland, white pigs of, 162.
Scott Shales (horse), 199.
Scrofula in pigs, 173.
Scrofulous rash, result of close-breeding, 17.
"Seg," 88.
Select Clydesdale Horse Society of Scotland, 321.
Servant, how to be a successful, 2.
Seton as a preventive of disease, belief in a, 88.
Shaw, A. W., on pigs, 156.
Shearing of sheep, 265.
— of sheep by mechanical means, advantages of, 267.
Sheds for cattle, 101.
Sheep, aboriginal features of, 12.
— blackfaced Highland, 249.
— blindness in, 295.
— "buisting" or marking of, 267.
— blotches in, 297.
— Border Leicester, 232.
— braxy in, 294.
— British, breeds of, 231.
— characteristics of British breeds, 231.
— Cheviot, 247.
— chick-weed hurtful to, 298.

Sheep, clipping or shearing of, 265.
— Clun Forest, 245.
— cost of, on a farm, 306.
— Cotswold, 235.
— dew-rot in, 297.
— diarrhœa in, 287.
— dip, constituents of, 282.
— dipping of, 277, 281.
— dogs, 299.
— dog trials, 305.
— Dorset and Somerset Horn, 246.
— Down-crosses, 246.
— drench for a, 289.
— effect of crossing on, 11.
— Flock Books, dates of establishment of, 325.
— eild, how known, 259.
— Exmoor, 256.
— feeding of, 93, 258, 270, 272, 306.
— flies affecting, 278.
— foot-rot in, 295.
— "gid" or "sturdy" in, 285.
— Hampshire Down, 242.
— Herdwick, 251.
— "husk" or "hoose" in, 288.
— improved English Leicester, 232.
— improved Lincoln, 234.
— kades or ticks on, 277.
— Kent or Romney Marsh, 236.
— lice, 278.
— Limestone breed of, 252.
— liver-rot in, 286.
— long-woolled Devon, 234.
— Lonk, 252.
— lung disease in, 290.
— management of, 290.
— Merino, 237.
— Metis-Merino, 240.
— mountain breeds, 247.
— Oxford Down, 245.
— parasites, external, on, 277.
— parasites, internal, in, 285.
— parturition of, 261.
— points of, 231.
Sheep pouring, 283.
— Roscommon, 236.
— Ryedale, 246.
— scab in, 280.
— short-wool, 240.
— Shropshire Down, 241.
— smear, recipe for, 284.
— smearing, 283.
— Societies for improvement of, information on, 323.
— Suffolk, 243.
— Sussex or Southdown, 240.
— tan-face, 256.
— trembling or loupin'-ill in, 292.
— tupping of, 257.
— turnip-troughs for, 271.
— urinary disorders of, 272.
— washing of, 265.
— Welsh mountain, 254.
— Wensleydale, 233.
— West Country Down, 242.
Shelter for cattle, 94, 101, 104, 116.
Shetland Pony Stud Book, 321.
Shire horse, the, 190.
— horse, the, compared with Clydesdale, 191.
— horse, the, names and history of, 191.
— Horse Society, 192, 321.
Shorthorn cattle, 29.
— cattle, unique position of, 69.
Shorthorns, Aberdeenshire, 39.
— "alloy" blood, origin of, 30.
— Collings' system of breeding, 32.
— colours of, 29, 30, 31.
— historical sketch of, 32.
— milking qualities of, 30.
— points of, 29.
— results of in-breeding on, 33.
— Society of Great Britain and Ireland, 322.
Shropshire Down sheep, 241.
— Sheep Breeders' Association and Flock Book Society, 322.

Smear, recipe for, 284.
Smearing, sheep, 283.
Societies, Live Stock, list of, 321.
"Soiling" of cows, 115, 121.
Somerset Park White Herd, 56.
— type of North Devon breed of cattle, 47.
South Devon breed of cattle, 47.
— Down Sheep Breeders' Association, 323.
— Wales black breed of cattle, 52.
— Wales white breed of cattle, 54.
Sow, breeding, general management of, 164.
Spanish merino, the, 237.
"Spayed" cows, 136.
Spencer, Sanders, on breeding of pigs, 156, 161.
"Sportsman" (horse), 200.
Stage-coach horses, 201.
Stallion, number of mares served by a, 214.
"Stanwick cow," the, 37.
"Standard Trotter," 205.
"Staple" of wool, correct use of the word, 234.
Stellaria media, 298.
Step, the, in animal locomotion, 332.
Stocking of farms, examples of, 306.
Storer, Rev. John, on wild cattle of Great Britain, 15, 17, 18, 22.
"Straining," effect of, in cows, 147.
Strathmore's, Lord, polled Angus herd, experiments with, 8.
Stride, the, in animal locomotion, 332.
Strongylus filaria, 288, 291.
"Studley" shorthorns, 36.
Suffolk breed of cattle, 57.
— breed of sheep, 243.
— breed of sheep, points of excellence of, 244.
— Sheep Society, 323.
— Punch, the, 193.
— Horse Society, 321.
Sugar cane as cattle food, 107.
Sunol (famous American trotter), 207.
Superpurgation, effect of, 144.
Sus indicus, 154.
— scrofa, 154.
Sussex breed of cattle, 47.
— bullocks as workers, 48.
— Herd Book Society, 322.
— or Southdown sheep, 240.
Swine fever, 174.
— societies for improvement of, information on, 323.

TABANUS bovinus, or gad fly, 117.
Tænia Cænurus, 285.
Tamworth breed of pigs, 163.
Tan face sheep, 256.
Tankerville, Earl of, owner of Chillingham Park, 17.
— on characteristics of wild cattle, 17, 18.
— on effects of crossing wild cattle with pure-bred shorthorns, 19.
Teats, bistoury for dilating, 133.
— second pair of rudimental, sometimes seen in British breeds of sheep, 230.
Teeswater cattle, 30, 70.
Teething of horses, 219.
Tegs, cost of feeding, 274.
— stock, 271.
Thomas, A. P., on liver-rot, 286.
Thompson's Black Horse, 181.
Thornton on Channel Islands cattle, 75.
Thornton's "Circular" on system of breeding, 31.
Thoroughbred horse, 194.
Ticks, 277.
— practice in Cape Colony with regard to, 294.
Tithe, 308.
Tomkins', Benjamin, system of breeding, 44.

Treacle as cattle food, 107.
Trichodectes scalaris or ox-louse, 90.
— sphærocephalus, 277.
"Trinity of Flyers," 207.
Trocar and canula for hoven, 139.
Trot, the, some consecutive phases of, 329.
Trotting horses, peculiarity of form of, 208.
— interest in, in America, 208.
— Union of Great Britain, 322.
Tupping, 257.
Turnips for cattle, 105.
Twins from mares, rarity of, 14.
Tympanitis in calves, 87.
Typhoid fever from contaminated water supply for cows, 118.

UDDER, inflammation of cows, 150.
Undocked roadsters, objection to, 217.
Urinary disorders of sheep, 272.
Uterus, inversion of, in cows, 147.
— inversion of, in ewes, 261.

VAGINA of cows, protrusion of the, 148.
Variation, definition of, 4.
Vaynol Park wild cattle, 23.
Ventilation, good, necessary for cows, 101, 128.

WALES, Prince of (a Clydesdale horse), 184.
Walk, the, some consecutive phases of, 326.
Walker's adaptation of the "Corrimony" wire fence, 272.
Wallace, John Henry, founder and compiler of the American Trotting Register, 204.
Warble maggot breathing tubes, 99.
Warington on dressed beef and live-weight, 110.
— on live-weight of pigs, 170.
"Warlaby" shorthorns, 36.
Washing of sheep, 265.
Water supply for cows, 118, 130.
— supply for horses, 225.
Watson, Hugh, as a breeder of cattle, 62.
Weaknesses, constitutional, of animals, 7.
Weaning of foals, 215.
— of lambs, 268.
Weed in cows, 150.
Weeding, or artificial selection, 6.
Weeds in pasture land, 119.
Weismann, Prof., on the theory of the continuity of germ-plasm, 5.
Welsh cattle, 52.
— cattle, milking qualities of, 53.
— flannel, 255.
— mountain sheep, 254.
"Welsh Runts," 53.
Wensleydale "crosses," 233.
— sheep, 233.
West Country Down sheep, 242.
— Highland breed of cattle, 50.
— Highland breed of cattle, points of, 51, 66.
— Highland bullocks, excellence of, 50.
— Highland calves, peculiarities of, 51.
"White heifer that travelled," the, 33.
White Polls, the, 56.
— scour in calves, 87.
Wild cattle, 15.
— cattle, untamable nature of, a seeming fallacy, 25.
— horses, 176.
Williams, Principal, on lung disease in sheep, 291.
— on horse disease, 223.
— on operation for "gid" in sheep, 286.

Williams, Professor, on prevention of abortion, 145.
— on loupin'-ill, 292.
Wilson's report on the fresh butter export trade of Victoria, 124.
Winter dairying, 124.
Wonderful (horse), 203.
Woodbastwick herd of cattle, 57.
Woollen cloth, Gloucester a centre of trade in, in the time of the Romans, 235.

YORKSHIRE coach-horse, the, 202.
— Coach-Horse Society, 321.
Yorkshire, large, breed of pigs, 158.
— middle-bred, breed of pigs, 160.
— small, breed of pigs, 159.
— breed of pigs, the, Sanders Spencer on, 161.
— trotters, 200.
Young, Arthur, on the Suffolk Punch, 193.

ZEBU race of cattle, features of, 18.
Zoological Society's Gardens, wild cattle at, 24.
Zündel on disease in lambs, 292.

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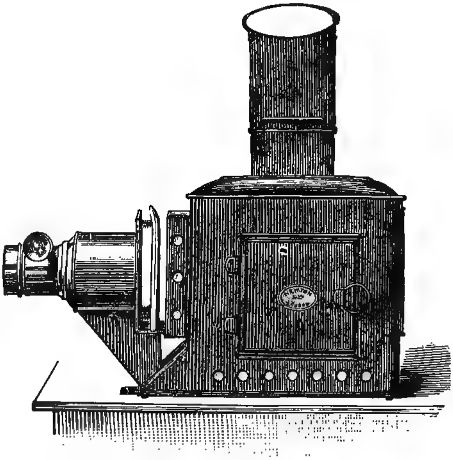

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